Proceedings and transactions of the Royal Society of Canada

Royal Society of Canada

INDIANA
UNIVERSITY
LIBRARY

GEOLOGY
LIBRARY

The Seal of the Royal Society of Canada Founded MDCCCLXXXII
Sapientia gubernator navem torquet, non valentia

MÉMOIRES

ET

COMPTES RENDUS

DE LA

SOCIÉTÉ ROYALE

DU

CANADA

SECONDE SERIE—TOME VIII

SÉANCE DE MAI 1902

EN VENTE CHEZ
JAS. HOPE ET FILS, OTTAWA; LA CIE COPP-CLARK (LIMITÉE), TORONTO
BERNARD QUARITCH, LONDRES, ANGLETERRE

1902

R.A. OFFICERS' LIBRARY
16 DEC. 1903
FOUNDED - WOOLWICH - 1807

PROCEEDINGS

AND

TRANSACTIONS

OF THE

ROYAL SOCIETY

OF

CANADA

SECOND SERIES—VOLUME VIII

MEETING OF MAY, 1902

FOR SALE BY
JAMES HOPE & SON, OTTAWA; THE COPP-CLARK CO. (LIMITED), TORONTO
BERNARD QUARITCH, LONDON, ENGLAND

1902

INDIANA UNIVERSITY LIBRARY

Q.41
.C2
Series 2
v. 8
copy 2

TABLE OF CONTENTS

List of Officers of the Society for 1902-1903 1

List of Fellows and Corresponding Members 2–4

List of Deceased Fellows 5

List of Presidents 6

PROCEEDINGS.

List of Fellows present at May meeting I

Report of Council II

1. *The Work of the Royal Society* II

2. *Printing of Transactions* IV

Accounts IV

3. *Decease of Fellows—Abbé Cuoq, Rev. Moses Harvey, Abbé Tanguay and Rev. Principal Grant (with portraits)* VI

4. *Election of New Fellows* VII

5. *Diploma of Fellowship* VIII

6 *Form of Nomination Paper* VIII

7. *Preparation and Publication of Annual Bibliographies by the Four Sections* IX

8. *Associated Societies* IX

9. *The Visit of their Royal Highnesses the Duke and Duchess of Cornwall and York* X

10. *Tribute to Sir Daniel Wilson* XI

11. *Preservation of Places of Scenic and Historic Interest* XII

12. *Archives* XIII

13. *A System of Triangulation along the 98th Meridian* XIV

14. *Ethnological Work in Canada* XIV

15. *International Congress of Americanists* XVIII

16. *The Montgomery Memorial* XIX

17. *Survey of Tides and Currents in Canadian Waters* XIX

18. *Marine Biological Station of Canada* XXIII

19. *Monument to Lieutenant-Governor Simcoe* XXVIII

20. *Wireless Telegraphy* XXIX

GENERAL BUSINESS.

Resolutions adopted XXIX
Reports of Associated Societies XXIX
Presidential Address by Principal Loudon XXX
Election of Members to Section III XXXI
Committee on Triangulation Survey appointed XXXI
Poet's Evening—Reading from their own works XXXII
Election of General Officers XXXII
General Business XL
Committee on Ethnological Work named XL
Committee on the Nomenclature of Geological Formations to continue inquiry XLI
Election of Member to Section IV XLI
Election of Members to Section II XLI
Resolution passed concerning work of Marine Biological Station XLI
Hon. Mr. Poirier's address on the site of Louisbourg XLII
Votes of Thanks to Toronto University and various committees XLIV

REPORTS OF SECTIONS.

Of First Section XXXII
Of Second Section XXXV
Of Third Section XXXVI
Of Fourth Section XXXIX

APPENDICES.

A.—PRESIDENTIAL ADDRESS.

The Universities in Relation to Research XLIX

B.—REPORTS FROM ASSOCIATED LITERARY AND SCIENTIFIC SOCIETIES IN CANADA.

I. *The Natural History Society of Montreal* LXIII
II. *La Société de Numismatique et d'Archéologie de Montréal* LXV
III. *The Literary and Historical Society of Quebec* LXVII
IV. *L'Institut Canadien de Québec* LXX
V. *The Ottawa Literary and Scientific Society* LXXI
VI. *The Ottawa Field Naturalists' Club* LXXIII

VII. *The Hamilton Scientific Association for the Promotion of Literature, Science and Art*.................. LXXVI
VIII. *The Entomological Society of Ontario* LXXVII
IX. *The Canadian Institute, Toronto*.......... LXXXII
X. *The Natural History Society of New Brunswick* ... LXXXIV
XI. *The Nova Scotian Institute of Science*......... LXXXVII
XII. *The Nova Scotia Historical Society*..................LXXXVIII
XIII. *The Natural History Society of British Columbia*.. LXXXIX
XIV. *The Wentworth Historical Society* XC
XV. *The Elgin Historical and Scientific Institute* XCI
XVI. *The Historical and Scientific Society of Manitoba*.. XCIII
XVII. *The Toronto Astronomical Society*........................ XCVI
XIX. *The Ontario Historical Society* C
XX. *The Women's Canadian Historical Society of Toronto* CI
XXI. *The Niagara Historical Society*........ CIII
XXII. *The United Empire Loyalists' Association of Ontario* CIV
XXIII. *The Women's Wentworth Historical Society*.......... CVII
XXIV. *The Miramichi Natural History Association* CVIII
XXV. *The Canadian Forestry Association*...................... CXIII
XXVI. *The Women's Canadian Historical Society of Ottawa* CXV
XXVII. *The Botanical Club of Canada* CXVIII

TRANSACTIONS.

SECTION I.

LITTÉRATURE FRANÇAISE, HISTOIRE, ARCHÉOLOGIE, ETC.

I. *Historique de la Bibliothèque du Parlement à Québec, 1792-1892.* Par N.-E. Dionne, M.D., LL.D.................. 3
II. *Etude ethnographique des éléments qui constituent la population du Canada—Origine de la population canadienne.* Par Sir James McPherson LeMoine, D.C.L.......... 15
III. *Le Régiment de Carignan (avec carte).* Par B. Sulte.... 25
IV. *Louisbourg en 1902. (Illustré.)* Par l'honorable Pascal Poirier.. 97
V. *L'Abbé Cuoq—Notice biographique.* Par A. F......... 127

SECTION II.

ENGLISH HISTORY, LITERATURE, ARCHÆOLOGY, ETC.

I. *Modern Public Libraries and their Methods.* By Lawrence J. Burpee.. 3
II. *The Underground Railway.* By Rev. Dr. Withrow.. 49

III. *The Old Basque Tombstones of Placentia. (Illustrated.)* By Rt. Rev. Bishop Howley.. 79
IV. *The First Legislators of Upper Canada.* By C. C. James, Toronto.. 93
V. *Family Memoirs of the McCollom Family—U. E. Loyalists.* By W. A. McCollom, Tilsonburg.......................... 121
VI. *Dochet (St. Croix) Island. (Illustrated.)* By W. F. Ganong, M.A., Ph.D 127
VII. *A Canadian Bibliography of the Year 1901.* By Lawrence J. Burpee 233

SECTION III.

MATHEMATICAL, PHYSICAL AND CHEMICAL SCIENCES.

I. *On the Stresses Developed in Beams Loaded Transversely. (With plates.)* By Henry T. Bovey, F.R.S............ 3
II. *Correlation of the Curve of the Second Order and the Sheaf of Rays of the Second Order in Geometry of Position. (With diagrams.)* By Professor Alfred Baker, M.A., of University of Toronto 29
III. *On the Determination of Moisture in Honey. (With plate.)* By Frank T. Shutt, M.A., F.I.C., F.C.S., and A. T. Charron, M.A...... 35
IV. *An Experimental Investigation of the Conditions Determining the Oxidation of Ferrous Chloride.* By A. McGill, B.A., B.Sc.. 47
V. *Researches in Physical Chemistry carried out in the University of Toronto during the Past Year.* By Professor W. Lash Miller.. 61
VI. *On the Use of Wheatstone Stereoscope in Photographic Surveying. (Illustrated.)* By E. Deville............ 63
VII. *Excited Radioactivity produced from Atmospheric Air. (Illustrated.)* By S. J. Allan, M.Sc., McGill University 71
VIII. *The Existence of Bodies Smaller than Atoms.* By E. Rutherford, M.A., D.Sc., McGill University.................. 79
IX. *On an Improved Method of Producing Concentrated Manure from Human Refuse. (With plan.)* By Thomas Macfarlane 87
X. *On Excited Radioactivity. (Illustrated.)* By R. M. Stewart, Toronto 97
XI. *The Specific Heats of Organic Liquids and their Heats of Solution in Organic Solvents. (With lithographed plate.)* By J. Wallace Walker, M.A., Ph.D., and James Henderson, B.Sc., Ph.D.......................... 105

XII. *Oudemans' Law and the Influence of Dilution on the Molecular Rotation of Mandelic Acid and its Salts.* By J. WALLACE WALKER, M.A., Ph.D 113
XIII. *An Abnormal Result in the Hydrolysis of Amygdaline.* By J. WALLACE WALKER, M.A., Ph.D., and W. S. HUTCHINSON, M.Sc.. 117
XIV. *On the Specific Heat of Water of Crystallization.* By NEVIL NORTON EVANS, M.Sc.. 121
XV. *The Variation in the Density of Ice. (Illustrated.)* By H. LESTER COOKE, B.A., McGill University................ 127
XVI. *The Fall of Potential Method as applied to the Measurement of the Resistance of an Electrolyte in Motion. (Illustrated.)* By H. T. BARNES, M.A.Sc., D.Sc., and J. GUY W. JOHNSON, B.A., McGill University 135
XVII. *On the Absolute Value of the Mechanical Equivalent of Heat.* By H. T. BARNES, M.A.Sc., D.Sc., McGill University 141
XVIII. *On the Density of Ice. (Illustrated.)* By H. T. BARNES, M.A.Sc., D.Sc., and H. LESTER COOKE, B.A., McGill University 143
XIX. *On a Theorem regarding Determinants with Polynomial Elements.* By W. H. METZLER, B.A., Ph.D., F.R.S.E., Syracuse University......... 157
XX. *On the Potential Difference required to produce Electric Discharge in Gases at Low Pressures—An Extension of Paschen's Law. (Illustrated.)* By W. R. CARR, B.A. 161

SECTION IV.

GEOLOGICAL AND BIOLOGICAL SCIENCES.

I. *Osmundites skidegatensis*, n. sp. *(Illustrated.)* By D. P. PENHALLOW 3
II. *Notes on Cretaceous and Tertiary Plants of Canada. (Illustrated.)* By D. P. PENHALLOW.......................... 31
III. *Notes on Cambrian Faunas. (With plate.)* By G. F. MATTHEW, LL.D................... 93
IV. *Further Experiments in Plant Breeding at the Experimental Farms. (Illustrated.)* By WM. SAUNDERS 115
V. *Some Features of the Flora of Northern New Brunswick.* By G. U. HAY, D.Sc....... 125
VI. *The Classification of the Archæan.* By PROF. A. P. COLEMAN, M.A., Ph.D........ 135
VII. *Bibliography of Canadian Zoology for 1900, exclusive of Entomology—Supplement.* By J. F. WHITEAVES...... 149

VIII. *Bibliography of Canadian Zoology for 1901, exclusive of Entomology.* By J. F. WHITEAVES........................ 151
IX. *Botanical Bibliography of Canada for 1901.* By A. H. MACKAY, LL.D 157
X. *Bibliography of Canadian Entomology for the year 1901.* By the Rev. C. J. S. BETHUNE, D.C.L.................. 161
XI. *Bibliography of Canadian Geology and Palæontology for the year 1901.* By Dr. H. M. AMI, of the Geological Survey 169
XII. *George Mercer Dawson.* By B. J. HARRINGTON 183
Bibliography of Dr. G. M. Dawson. By H. M. AMI.......... 192

LIST OF ILLUSTRATIONS.

PROCEEDINGS.

Portraits of Deceased Fellows—Abbé Cuoq, Rev. Moses Harvey, LL.D., Mgr. C. Tanguay, Principal G. M. Grant, D.D.. IV *et seq*
Three illustrations to accompany Botanical Club's report CXXXIII

SECTION I.

Map to accompany Mr. Sulte's paper on "Régiment de Carignan".. 25
Ten photographic plates to illustrate Hon. Mr. Poirier's paper on "Louisbourg en 1902".. 97 *et seq.*

SECTION II.

Six illustrations to accompany Rt. Rev. Bishop Howley's paper on "Old Basque Tombstones at Placentia"....... 80 *et seq.*
Fourteen maps and ten photographic plates to accompany Prof. Ganong's paper on "Dochet (St. Croix) Island" 127 *et seq.*

SECTION III.

Twenty-eight diagrams and one photographic plate to accompany Dr. Bovey's paper on "Stresses in Beams loaded transversely" .... 3 *et seq.*
Three diagrams to illustrate Prof. Baker's paper on "Correlation of Curve of the Second Order"....... .... 29 *et seq.*

One photographic plate to illustrate Messrs. Shutt and Charron's paper on "Moisture in Honey"........................ 37
Four diagrams to accompany Mr. Deville's paper on "Wheatstone Stereoscope in Surveying"........................ 66 *et seq.*
Five diagrams to illustrate Mr. Allan's paper on "Radioactivity from Atmospheric Air"........................ 72 *et seq.*
One large plate to accompany Mr. Macfarlane's paper on "Method of producing manure"........................ 95
One diagram to accompany Mr. Stewart's paper on "Excited Radioactivity"........................ 99
One lithographed diagram for Messrs. Walker and Henderson's paper on "Specific Heats of Organic Liquids"... 112
Three illustrations in text to accompany Mr. Cooke's paper on "Variation in Density of Ice"........................ 128
Two diagrams to accompany Messrs. Barnes and Johnson's paper on "Fall of Potential Method"........................ 136 *et seq.*
Five diagrams to illustrate Messrs. Barnes and Cooke's paper on "Density of Ice"........................ 148 *et seq.*
Eight diagrams to accompany Mr. Carr's paper on "An Extension of Paschen's Law"........................ 164 *et seq.*

SECTION IV.

Eight illustrations in text and ten photographic plates to illustrate Prof. Penhallow's paper on "Osmundites skidegatensis"........................ 6 *et seq.*
Eight illustrations in text and twenty photographic plates to accompany Prof. Penhallow's paper on "Cretaceous and Tertiary Plants of Canada"........................ 36 *et seq.*
One plate of Fossils to accompany Dr. Matthew's paper on "Cambrian Faunas"........................ 112
Six illustrations in text to illustrate Dr. Saunder's paper on "Experiments in Plant Breeding"........................ 120 *et seq.*

THE ROYAL SOCIETY OF CANADA.

FOUNDER: HIS GRACE THE DUKE OF ARGYLL, K.G., &c.,
(WHEN GOVERNOR-GENERAL OF CANADA IN 1882.)

OFFICERS FOR 1902-1903.

HONORARY PRESIDENT:
HIS EXCELLENCY THE RT. HON. THE EARL OF MINTO, G.C.M.G., &c.

PRESIDENT—SIR JAMES A. GRANT, K.C.M.G., M.D.

VICE-PRESIDENT—LT.-COL. G. T. DENISON, B.C.L.

OFFICERS OF SECTIONS:

SEC. I.—French Literature, History, and Allied Subjects.

PRESIDENT, ...	HON. PASCAL POIRIER
VICE-PRESIDENT, ...	DR. ADOLPHE POISSON
SECRETARY, ...	DR. DIONNE.

SEC. II.—English Literature, History, and Allied Subjects.

PRESIDENT, ...	D. CAMPBELL SCOTT.
VICE-PRESIDENT, ...	REV. DR. BRYCE.
SECRETARY, ...	DR. GEO. STEWART.

SEC. III—Mathematical, Physical, and Chemical Sciences.

PRESIDENT, ...	PROF. GOODWIN.
VICE-PRESIDENT, ...	DR. ELLIS.
SECRETARY, ...	E. DEVILLE.

SEC. IV.—Geological and Biological Sciences.

PRESIDENT, ...	PROF. T. WESLEY MILLS.
VICE-PRESIDENT, ...	DR. G. U. HAY.
SECRETARY, ...	PROF. A. P. COLEMAN.

ACTING HONORARY SECRETARY, ..	DR. S. E. DAWSON.
HONORARY TREASURER, ...	DR. JAMES FLETCHER.

ADDITIONAL MEMBERS OF COUNCIL:[1]

REV. PROFESSOR CLARK.
DR. FRECHETTE, C.M.G.
SIR S. FLEMING, K.C.M.G.
DR. S. E. DAWSON.
PRINCIPAL LOUDON.
DR. DECELLES
MR. T. C. KEEFER, C.M.G.

---

[1] The Council for 1902-1903 comprises the President and Vice-President of the Society, the Presidents, Vice-Presidents and Secretaries of Sections, the Honorary Secretary and the Honorary Treasurer, besides ex-Presidents of the Society during three years from the date of their retirement, and not more than four members of the Society who have formerly served on the Council, elected by the Council.

THE ROYAL SOCIETY OF CANADA

LIST OF MEMBERS, 1902-1903.

I.—LITTÉRATURE FRANÇAISE, HISTOIRE, ARCHÉOLOGIE, ETC.

Beauchemin, Nérée, M.D., *Yamachiche, P.Q.*
Bégin, Mgr L.-N., Archevêque de Québec, *Québec.*
Bellemare, Raphael, docteur ès lettres, *Montréal.*
Bourassa, l'abbé Gustave, docteur ès lettres, *Montréal.*
Casgrain, l'abbé H.-R., docteur ès lettres, *Québec* (ancien président).
Chapais, l'hon. Thomas, docteur ès lettres, chevalier de la légion d'honneur de France, membre du conseil législatif, *Québec.*
Charland, Frère Paul-V., Couvent des Dominicains, *Lewiston, Me., U.S.A.*
David, L.-O., *Montréal.*
DeCazes, Paul, docteur ès lettres, *Québec.*
DeCelles, A.-D., docteur ès lettres, LL.D., officier de l'instruction publique, *Ottawa.*
Dionne, N.-E., docteur ès lettres, *Québec.*
Fabre, Hector, C.M.G., officier de la légion d'honneur, *Paris, France.*
Fréchette, Louis, C.M.G., docteur en droit, docteur ès lettres, chevalier de la légion d'honneur, *Montréal* (ancien président).
Gagnon, Ernest, docteur ès lettres, officier de l'instruction publique, *Québec.*
Gérin, Léon, *Ottawa.*
Gosselin, l'abbé Auguste, docteur ès lettres, *St-Charles de Bellechasse, P.Q.*
Legendre, Napoléon, docteur ès lettres, *Québec.*
LeMay, Pamphile, docteur ès lettres, *Québec.*
LeMoine, Sir J.-M., *Québec* (ancien président).
Poirier, Hon. Pascal, officier de la légion d'honneur, *Shediac, N.B.*
Poisson, Adolphe, docteur ès lettres, *Arthabaskaville, P.Q.*
Richard, Edouard, *Arthabaskaville, P.Q.*
Routhier, Juge A.-B., docteur en droit et ès lettres, *Québec.*
Roy, Joseph-Edmond, officier d'académie et docteur ès lettres, *Lévis, P.Q.*
Sulte, Benjamin, *Ottawa.*

II.—ENGLISH LITERATURE, HISTORY, ARCHÆOLOGY, ETC.

Bryce, Rev. George, M.A., LL.D., *Winnipeg, Man.*
Burwash, Rev. Nathaniel, S.T.D., LL.D., Chancellor of Victoria University, *Toronto.*
Campbell, Rev. John, LL.D., Presbyterian College, *Montreal.*
Campbell, W. Wilfred, Privy Council Office, *Ottawa.*
Clark, Rev. W., D.C.L., LL.D., Trinity University, *Toronto* (ex-president).
Dawson, S. E., Lit.D., *Ottawa.*
Denison, Lt.-Col. G. T., B.C.L., *Toronto.*
Drummond, W. H., M.D., *Montreal.*
Harvey, Arthur, *Toronto.*
Howley, Right Rev. Bishop M. F., D.D., *St. John's, Nfld.*
Lighthall, William Douw, M.A., B.C.L., *Montreal.*
Longley, Hon. J. W., LL.D., M.L.A., *Halifax, N.S.*

McLennan, W., *Montreal.*
Murray, **George**, B.A., *Montreal.*
Murray, **Rev. J. Clark**, LL.D., McGill University, *Montreal.*
O'Brien, **Most Rev. Dr.**, Archbishop of Halifax, *Halifax, N.S.*, (ex-president).
Parkin, G. R., C.M.G., LL.D., *Toronto.*
Reade, **John**, F.R.S.L., *Montreal.*
Ross, **Hon. Geo. W.**, LL.D., Prime Minister of Ontario, *Toronto.*
Scott, D. **Campbell**, Department of Indian Affairs, *Ottawa.*
Scott, **Rev. Frederick George**, *Quebec.*
Stewart, **George**, D.C.L., LL.D., D.L., F.R.G.S., *Quebec.*
Watson, J., M.A., LL.D., Queen's University, *Kingston.*
Willison, **John S.**, *Toronto.*
Withrow, **Rev.** W. H., D.D., *Toronto.*

III.—MATHEMATICAL, PHYSICAL AND CHEMICAL SCIENCES.

Baillairgé, C., C.E., *Quebec.*
Baker, **Alfred**, M.A., University of Toronto, *Toronto.*
Barnes, H. T., D.Sc., McGill University, *Montreal.*
Bovey, H. T., M.A. (Cantab.), LL.D., D.C.L., M. Inst. C.E., F.R.S., McGill University, *Montreal.*
Cox, **John**, M.A. (Cantab.), McGill University, *Montreal.*
Dawson, W. **Bell**, D.Sc., Ma. E., Assoc. M. Inst. C.E., *Ottawa.*
Deville, E., Surveyor-General, *Ottawa.*
Dupuis, N. F., M.A., F.R.S.E., Queen's University, *Kingston.*
Ellis, W. H., M.D., Toronto University, *Toronto.*
Fleming, **Sir Sandford**, K.C.M.G., LL.D., C.E., *Ottawa* (ex-president).
Girdwood, G. P., M.D., McGill University, *Montreal.*
Glashan, J. C., LL.D., Inspector of Public Schools for City of Ottawa, *Ottawa.*
Goodwin, W. L., D.Sc., Queen's University, *Kingston.*
Hamel, **Monsignor**, M.A., Laval University, *Quebec* (ex-president).
Harrington, B. J., B.A., Ph.D., McGill University, *Montreal.*
Hoffmann, G. C., F. Inst. Chem., LL.D., Geological Survey, *Ottawa.*
Johnson, A., LL.D., McGill University, *Montreal.*
Keefer, T. C., C.M.G., C.E., *Ottawa* (ex-president).
Loudon, J. T., M.A., LL.D., President of University of Toronto, *Toronto* (ex-president).
Macfarlane, T., M.E., Chief Analyst, *Ottawa.*
McGill, A., Assistant Analyst, *Ottawa.*
Miller, W. **Lash**, Ph.D., University of Toronto, *Toronto.*
McLeod, C. H., M.E., McGill University, *Montreal.*
Owens, R. B., M.Sc., McGill University, *Montreal.*
Rutherford, E., B.A. (Cantab), A.M., McGill University, *Montreal.*
Ruttan, R. F., M.D., C.M., McGill University, *Montreal.*
Shutt, F. T., M.A., F.I.C., F.C.S., Chemist, Central Experimental Farm, *Ottawa.*
Stupart, R. F., Superintendent, Meteorological Service, *Toronto.*
Walker, J. **Wallace**, M.A., Ph.D., McGill University, *Montreal.*

IV.—GEOLOGICAL AND BIOLOGICAL SCIENCES.

Adami, J. G., M.A., M.D. (Cantab. and McGill), LL.D., F.R.S.E., McGill University, *Montreal.*
Adams, **Frank**, M.E., **Ph. D.**, McGill University, *Montreal.*
Ami, **Henry M.**, M.A., D.Sc., F.G.S., Geological Survey, *Ottawa.*
Bailey, L. W., M.A., Ph.D., University of New Brunswick, *Fredericton.*
Bell, **Robert**, B.Ap.Sc., M.D., LL.D., F.G.S., F.R.S., Geological Survey, *Ottawa.*
Bethune, **Rev.** C. J. S., M.A., D.C.L., *London, Ont.*

Burgess, T. J. W., M.D., *Montreal.*
Coleman, A. P., M.A., Ph.D., University of Toronto, *Toronto.*
Ells, R. W., LL.D., F.G.S.A., Geological Survey, *Ottawa.*
Fletcher, James, LL.D., F.L.S., Dominion Entomologist, *Ottawa.*
Fowler, James, M.A., Queen's University, *Kingston.*
Gilpin, Edwin, M.A., F.G.S., Inspector of Mines, *Halifax.*
Grant, Sir J. A., K.C.M.G., M.D., F.G.S., *Ottawa.*
Hay, G. U., M.A., Ph.D., *St. John, N.B.*
Harrington, W. **Hague**, P. O. Department, *Ottawa.*
Laflamme, Abbé J. C. K., D.D., M.A., chevalier de la légion d'honneur, Laval University, *Quebec* (ex-president).
Lambe, Lawrence M., F.G.S., Geological Survey, *Ottawa.*
Macallum, A. B., Ph.D., University of Toronto, *Toronto.*
Macoun, J., M.A., F.L.S., Geological Survey, *Ottawa.*
MacKay, A. H., LL.D., B.Sc., Superintendent of Education for Nova Scotia, *Halifax.*
Matthew, G. F., M.A., D.Sc., *St. John, N.B.*
Mills, T. **Wesley**, M.A., M.D., McGill University, *Montreal.*
Penhallow, D. P., B.Sc., McGill University, *Montreal.*
Poole, H. S., M.A., C.E., F.G.S., Assoc. Roy. Soc. of Mines, *Halifax, Nova Scotia*
Prince, E. E., B.A., F.L.S., Dominion Commissioner of Fisheries, *Ottawa*
Saunders, W., LL.D., F.L.S., Director Dominion Experimental Farms, *Ottawa*
Taylor, Rev. G. W., *Nanaimo, B.C.*
Whiteaves, J. F., LL.D., F.G.S., Geological Survey, *Ottawa.*
Wright, R. **Ramsay**, M.A., B.Sc., University of Toronto, *Toronto.*

CORRESPONDING MEMBERS.

His Grace the Duke of Argyll, K.G., K.T., F.R.S., &c.

Berthelot, Marcelin, Sénateur, Secrétaire Perpétuel de l'Académie des Sciences, Professeur au Collège de France, *Paris, France.*
Bonney, T. G., D.Sc., LL.D., F.R.S., *London, England.*
Bryce, Rt. Hon. James, M.P., D.C.L., *London, England.*
Claretie, Jules, de l'Académie française, *Paris, France.*
Gravier, Gabriel, *Rouen, France.*
Hector, Sir James, K.C.M.G., F.R.S., *Wellington, New Zealand.*
Higginson, Thomas Wentworth, LL.D. (Harvard), *Cambridge, Mass.*
Metzler, W. H., Ph.D., F.R.S. Edin., Mathematical Professor, Syracuse University, *Syracuse, N. Y.*
Parker, Sir Gilbert, Kt., M.P., D.C.L., London, England.
Scudder, Dr. S. H., *Cambridge, Mass., U.S.A.*

RETIRED MEMBERS. (See Rule 7.)

Bourassa, Napoléon, *St. Hyacinthe, P.Q.*
Callendar, Hugh L., M.A. (Cantab.), F.R.S., *London, Eng.*
Chapman, E. J., Ph.B., LL.D., *London, Eng.*
Cherriman, J. B., M.A., *Ryde, Isle of Wight.*
Haanel, E., Ph.D., Superintendent of Mines, *Ottawa.*
Kirby, W., *Niagara, Ont.*
MacGregor, J. G., M.A., D.Sc., F.R.S., F.R.S.E., *Edinburgh, Scotland.*
Mair, Charles, *Prince Albert, N.W.T.*
Osler, W., M.D., Johns Hopkins University, *Baltimore, Md.*
Roberts, C.G.D., M.A., *New York.*

DECEASED MEMBERS.

Bayne, Herbert A., M.A., Ph.D., Royal Military College.
Bourinot, Sir John George, K.C.M.G., LL.D., D.C.L., D.L. (Laval), Clerk of the House of Commons.
Brymner, Douglas, LL.D., Dominion Archivist.
Bucke, R. Maurice, M.D.
Carpmael, C., M.A., Superintendent Meteorological Service.
Chauveau, Hon. P. J. O., LL.D., L.D., Premier and Minister of Education for Quebec.
Cuoq, l'Abbé.
Dawson, Rev. Æneas McD., LL.D.
Dawson, Sir J William, C.M.G., LL.D., F.R.S., President McGill University.
Dawson, Dr. Geo. M., C.M.G., D.Sc., F.R.S., A.R.S.M., F.G.S., Director Geological Survey.
Dent, J. C.
Dunn, Oscar, Secretary Department of Education for Quebec.
Edgar, Sir James, K.C.M.G., M.P., D.C.L., Speaker House of Commons.
Faucher de St-Maurice, docteur ès lettres, chevalier de la légion d'honneur.
Fortin, Hon. P., M.D., Senator.
Gilpin, J. Bernard, M.D.
Gisborne, F. N., M.I.T.E.E., C.E., Superintendent of Dominion Telegraphs.
Grant, Very Rev. G. M., D.D., Principal of Queen's University.
Hale, Horatio, M.A. (Harvard).
Harvey, Rev. Moses, F.R.G.S., LL.D.
Honeyman, Rev. D., D.C.L.
Hunt, T. Sterry, M.A., LL.D., F.R.S.
Kingsford, William, LL.D.
Lampman, Archibald.
Lawson, G., Ph.D., LL.D.. Dalhousie University.
Lesperance, J. T.
Lusignan, A.
Lyall, Rev. W., LL.D., Dalhousie University.
MacCabe, J. A., LL.D., Principal of Ottawa Normal School.
Marchand, Hon. F. G., docteur ès lettres, Premier of Quebec.
Marmette, Joseph, docteur ès lettres, assistant archivist.
Murray, Alexander, C.M.G., F.G.S., Director Geological Survey of Newfoundland.
McColl, Evan.
Patterson, Rev. Geo., D.D., LL.D.
Provancher, Abbé.
Royal, Hon. Joseph, Lieutenant-Governor of Northwest Territories.
Schultz, Sir John, LL.D., M.D., Lieutenant-Governor of Manitoba.
Selwyn, A. R. C., C.M.G., LL.D., F.R.S., F.G.S., Director of the Geological Survey.
Tanguay, Mgr Cyprien, docteur ès lettres.
Tassé, Hon. Jos., Senator.
Todd, Alpheus, C.M.G., LL.D., Librarian of Parliament.
Verreau, l'Abbé Hospice, docteur ès lettres, Principal of Jacques Cartier Normal School.
Williamson, Rev. Dr., Queen's University.
Wilson, Sir Daniel, Kt., President University of Toronto.
Young, Rev. G. Paxton, LL.D., University of Toronto.

LIST OF PRESIDENTS.

1882-'83	Sir J. W. Dawson, Kt.
1883-'84	L'Honorable P. J. O. Chauveau.
1884-'85	Dr. T. Sterry Hunt.
1885-'86	Sir Daniel Wilson, Kt.
1886-'87	Monsignor Hamel.
1887-'88	Dr. G. Lawson.
1888-'89	Sir Sandford Fleming, K.C.M.G.
1889-'90	L'abbé Casgrain.
1890-'91	Very Rev. Principal Grant.
1891-'92	L'abbé Laflamme.
1892-'93	Sir J. G. Bourinot, K.C.M.G.
1893-'94	Dr. G. M. Dawson, C.M.G.
1894-'95	Sir J. Macpherson LeMoine, Kt.
1895-'96	Dr. A. R. C. Selwyn, C.M.G.
1896-'97	Most Rev. Archbishop O'Brien.
1897-'98	L'Honorable F. G. Marchand
1898-'99	T. C. Keefer, C.M.G.
1899-1900	Rev. Professor Clark, D.C.L.
1900-1901	L. Frechette, C.M.G., LL.D.
1901-1902	Principal Loudon, LL.D.
1902-1903	Sir James A. Grant, K.C.M.G., M.D., F.G.S.

For Rules and Regulations of the Royal Society of Canada, Revised to May 1901, see beginning of Vol. VI. Trans. R. S.

ROYAL SOCIETY OF CANADA.

PROCEEDINGS FOR 1902.

TWENTY-FIRST GENERAL MEETING.

SESSION I. (May 27.)

The Royal Society of Canada held its twenty-first general meeting in the West Hall, Main Building, of Toronto University.

The Fellows and delegates from affiliated societies met in the office of President Loudon and registered their names in the Attendance Roll, between the hours of 9.30 and 10.15.

The President, Dr. James Loudon, took the chair at 10.30 o'clock a.m., and formally called the meeting to order.

The Honorary Secretary being absent, Dr. James Fletcher acted as Secretary, and called the roll of Fellows.

The following gentlemen answered to their names:—

List of Fellows Present:—

President, Principal Loudon.

Honorary Secretary, absent through illness.

Honorary Treasurer, James Fletcher.

Section I.—A. D. DeCelles, Hon. Pascal Poirier, N. E. Dionne, Edmond Roy.

Section II.—Rev. George Bryce, W. Wilfrid Campbell, Rev. W. Clark, Arthur Harvey, Hon. J. W. Longley, Geo. Murray, Rev. J. Clark Murray, D. Campbell Scott, Rev. F. G. Scott, J. Watson, Rev. W. H. Withrow.

Section III.—Alfred Baker, H. T. Bovey, John Cox, W. H. Ellis, Sir Sandford Fleming, G. P. Girdwood, W. L. Goodwin, B. J. Harring[illegible] A. Johnson, J. Loudon, A. McGill, W. Lash Miller, C. H. McLeod, [illegible] Rutherford, R. F. Ruttan, F. T. Shutt, R. F. Stupart, J. Wallace Walker.

Section IV.—Frank Adams, L. W. Bailey, Rev. Dr. Bethune, T. J. W. Burgess, J. Fletcher, James Fowler, Sir James A. Grant, G. U.

Hay, A. B. Macallum, A. H. MacKay, G. F. Matthew, T. Wesley Mills, D. P. Penhallow, H. S. Poole, R. Ramsay Wright.

Letters regretting their inability to attend were read from His Grace Archbishop Bégin, L. Fréchette, Abbé Gosselin, Mgr. Laflamme, Sir James LeMoine, His Grace Archbishop O'Brien.

Four new Fellows, Prof. Macallum, Rev. George Brycé, R. F. Stupart and Prof. A. Wallace Walker were duly introduced and took their seats.

The Acting Secretary then read the following

REPORT OF COUNCIL.

The Council of the Royal Society of Canada have the honour to present their twentieth report as follows:—

1. The Work of the Royal Society.

So far the results that have been reached amid all the disadvantages that necessarily stand in the way of intellectual progress of any high order in a relatively new country are of a character which should give the Society much confidence in the future. On the whole these results may fairly challenge comparison with the work of similar institutions in other and older countries. For some years the contributions to the French and English literary sections have taken a far wider range than at any previous time since its organization. The catholicity of the Society, in a secular sense, can be judged from the presence of men differing widely in politics, creed, and opinion, but meeting here on a common platform of intellectual advancement, and in this way doing not a little to remove those asperities and prejudices which do so much to keep men apart in the world.

The Society rests on a broad basis of thought and discussion, and recognizes no sectional, political or sectarian distinctions in the selection of its members, or in the pages of its "Transactions," carefully avoiding all those purely controversial or party questions which are antagonistic to the success of a literary and scientific association. It claims at the same time for its members the freest and fullest discussion within the limits of its legitimate work. It is not selfish or narrow in its aim or object, and the literary or scientific student who has anything valuable to offer will always find free access to its pages. If we consult the programme of the present meeti
it will be seen that a fair proportion of the papers are offered by learned divines, public functionaries, and scholars who are not members of the organization, but come forward voluntarily to give us the

benefit of their mature thought and study. On this basis the Society has already been able to enlist the cordial and active co-operation of a number of able scholars and thinkers, whilst at the same time adhering to that rule of limited membership which it has always deemed best calculated to sustain the high standard which is necessary for the development of literary and scientific culture. It is satisfactory to know that the labours of the Society have so far obtained an amount of recognition among scientific and literary bodies of other countries that fully comes up to the hopes of its most sanguine promoters and friends. The "Transactions" reach every scientific, historical and literary society, as well as library of note throughout the world, and it is now beyond our means to meet the demands that are made upon us to supply the early volumes of the series. The Society has circulated its "Transactions" with great liberality, under the conviction that it can in this way best discharge the responsibility that parliament has placed upon it in placing at its disposal a generous grant for the publication of its proceedings.

In its typographical appearance, and wealth of illustrations and maps, the "Transactions" are only equalled by some half dozen societies of a cognate character in Europe and America. The Council are convinced that the wide distribution of the volumes has been a positive advantage to Canada, since they have reached a large body of learned men and earnest students in many countries who otherwise would know very little of many phases of the scientific, material, political and intellectual progress of Canada.

The contents of the "Transactions" are now so varied in their character, that the foreign reader can gather a vast amount of information in the eighteen quarto and octavo published volumes respecting the Dominion, that no other series of volumes, printed in this or any other country, can pretend to offer. Papers on the geology and mineralogy of the Dominion supplement the labours of the able geological staff of Canada, and are printed simultaneously with disquisitions on the development of government, and the nature of our political institutions.

The canal system of Canada is brought to our notice, as well as the progress of literature and science in French and English Canada. The language and traditions of the aborigines are treated with as much fulness as are the history and story of the ancient rocks. Under the circumstances the Royal Society claims from the Canadian people the same encouragement and attention that it is receiving from those countries where its "Transactions" are now studied, and at the same time appeals to its own members to keep ever steadily in view the high duty and responsibility resting upon every one of them. To quote the language of one of its founders twelve years ago: "We must discharge this high duty and responsibility in the most perfect manner possible and with a regard not to personal, party or class views, but to the welfare of Canada and its reputation before the world. We should prove ourselves first unselfish and zealous literary and scientific men, and next Canadians in that widest sense of the word in which we shall desire, at any personal sacrifice, to promote the best interests of our country by the aid of a pure and elevated literature, and a true, profound and practical science."

2. Printing of Transactions.

The seventh volume of the new series of the Transactions of the Society is now in the binders' hands, and will be distributed immediately. It contains 915 pages of letter press, and is consequently one of the largest and most expensive issued since the adoption of the royal octavo form. It is also noteworthy for a great number of maps, portraits, diagrams and other illustrations it contains, nearly one hundred in the aggregate. A great number of pamphlets containing the essays of members, have been distributed free of all expense to authors for purposes of general circulation. The first and second sections of literature and history largely exceed the scientific sections in the quantity of matter. All the printing accounts have been duly audited by officers of the printing department of the Government, and all maps and illustrations have been admirably executed under the intelligent supervision of the King's Printer, Dr. S. E. Dawson, who is a member of the printing committee. All cheques paid by the Society out of the Government grant, have also been duly submitted to the Auditor-General of Canada. The finances of the Society are in a satisfactory condition, despite the large bulk of the present volume, and the liberality of the distribution of the Transactions and separate authors' pamphlets. The Honorary Treasurer has now in hand a balance of $1,623.87 to the credit of the Society.

General Financial Statement of the Royal Society of Canada from May 21st, 1901, until May 23rd, 1902.

Dr.

By cash in hands of Honorary Secretary..	$ 687 84
" Government Grant for 1901-2..	5,000 00
Advanced by Honorary Secretary..	13 06
	$5,700 90

1901		*Cr.*		
May	27	Gazette Printing Co..	$ 485 35	
“	27	Taylor & Clarke..	23 00	
“	27	Ottawa Citizen (printing)...	12 00	
“	27	Journal (printing).	12 00	
“	27	Free Press (printing).	9 00	
“	27	W. C Bowles (clerical aid)..	60 00	
June	18	Grip Print. and Pub. Co. (illustrations).	46 50	
“	18	Geo. E. Littlefield (engravings).	2 60	
“	18	Manfg. Stationers' Co. (binding, etc.)..	50 45	
Sept.	26	Gazette Printing Co. (printing).	800 00	
“	26	S. T. Ami (proof-reading)...	30 00	
“	26	Dominion Express Co...	65	
“	26	Grip Print. and Pub. Co. (illustrations).	74 00	
“	26	The Copp Clark Co. (binding)..	2 50	
“	26	Bishop Engr. & Print. Co. (illustrations).	58 00	
“	26	James Ewing (draughting)..	8 00	
“	26	The Mortimer Co. (illustrations).	7 35	
“	26	I. W. Cadby (illustrations)..	5 18	
“	26	H. H. Langton (books for illustrations)	4 00	
“	26	B. Quaritch (illustrations)..	30 00	
“	26	A. Putnell (illustrations).	1 50	
“	30	W. Notman & Son (photos)..	1 50	
“	30	Manfg. Stationers' Co. (binding, etc.)..	973 36	
Dec.	17	S. T. Ami (proof-reading)..	30 00	
“	17	A. Frechette (French proof-reading)...	30 00	
“	17	R. P. King (illustrations).	40 00	
“	17	H. Stevens & Son (illustrations).. ..	20 00	
“	17	Maggs Bros. (illustrations)..	20 00	
“	17	Ottawa Paper Box Co...	8 00	
“	18	Grip Print. and Pub. Co. (illustrations).	15 50	
“	26	Gazette Printing Co. (printing).	800 00	
1902.				
Feb.	24	Gazette Printing Co..	1,200 00	
Mar.	10	J. Robertson (storage of books).	36 00	
May	23	S. T. Ami (proof-reading).	60 00	
May	23	Cash in hands of Honorary Secretary..	744 46	
				$5,700 90

3. Decease of Members.

It is the melancholy duty of the Council to record the decease of four of the Fellows who have been associated with the work of the Society since its foundation in 1882: Abbé Cuoq, Monsignor Tanguay, Rev. Moses Harvey, of Newfoundland, and the Rev. Principal Grant; they had reached an advanced age when they were called upon to lay down the burden of their useful lives.

Abbé Cuoq had been for years preparing to meet death in the calm seclusion of one of those monastic institutions which the Roman Catholic Church provides for its faithful clergy when age and infirmity unfit them for the active pursuits of life.

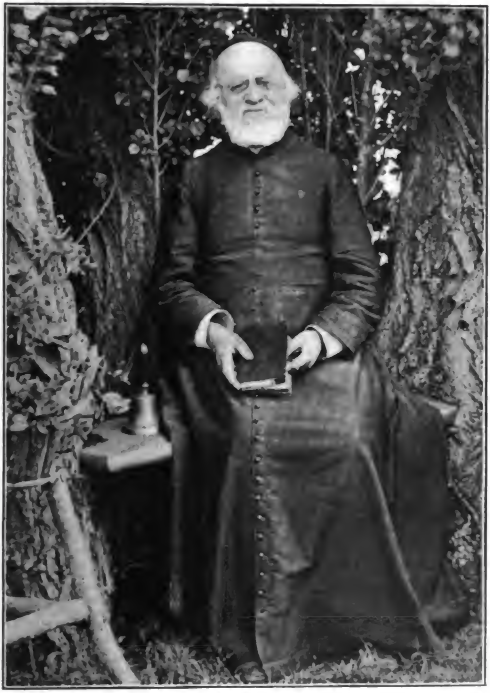
He belonged to that long list of scholars who have devoted themselves for centuries in Canada to the study of the Indian languages and character. Some of his elaborate essays on the Algonquin tongue appear in the early numbers of the Transactions of the Society and attest eloquently the vast range of his investigations and accurate learning.

Rev. Dr. Harvey was identified during a long and earnest life with the ancient colony of Newfoundland, in whose history he was deeply versed. His historical contributions are of great value and won for him at home and abroad a high reputation. He took a deep interest in the work of the Royal Society and contributed to its Transactions, besides lending his valuable aid to the Cabot celebration which the Royal Society initiated so successfully some years ago.

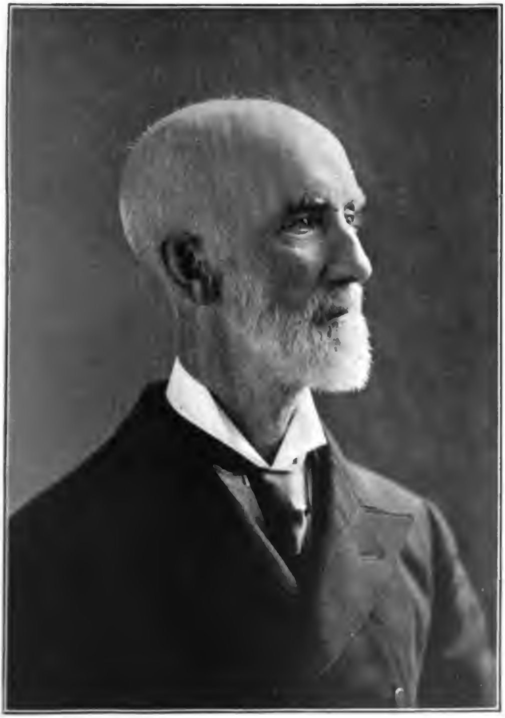
The Society has also to record the death of the venerable Abbé Tanguay, at the ripe age of 84. He had been identified with the work of the Society since its foundation, and was one of the most regular attendants at its general meetings.

He was a man of high culture, deeply versed in the history of the province of Quebec. He possessed a genial, companionable disposition which endeared him to his numerous friends and his associates in the Society, in whose success he had the most perfect confidence. Those who knew him best will always cherish the memory of this distinguished scholar and divine.

By the death of Principal Grant, Canada has lost one of her most useful and eminent sons. He was remarkable for his great energy, for his knowledge of the questions of the day, for his versatility as a scholar, divine, teacher and writer, for his ability to impress all those with whom he came into contact, for his success in bringing to a satisfactory conclusion any undertaking with which he was associated, for his fearless expression of opinion on leading social,

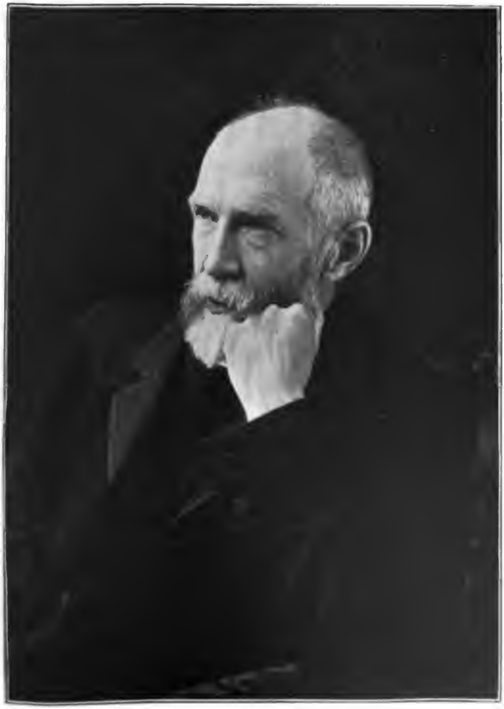


ABBÉ CUOQ.



REV. MOSES HARVEY, LL.D

MGR. C. TANGUAY.



Principal G. M. Grant, D.D.

economic and political subjects. He was a man noted for his originality of thought. He had a sense of humour and a capacity for sarcasm which he was apt to level against the shams of modern conditions of life. But withal he had a great heart and was ever ready to make allowance for the weaknesses of human nature. He was essentially a leader of men, and down to the very hour of his death occupied a most conspicuous place in the public eye. He had a perfect confidence in the greatness of this country, and was always an earnest advocate of the imperial connection. He has many claims on the gratitude of his fellow-countrymen; but probably his greatest and most durable work is the high position which Queen's University has been able to assume among the higher educational institutions through his untiring energy and fidelity to her interests. He was one of the original members of the Royal Society, and was chosen one of its presidents, though his many engrossing duties prevented him from making any special contribution to its Transactions. Indeed, his fame will rest not on his literary work, which was for the most part of ephemeral interest, but on the influence he exercised on public opinion during his life of rare activity, and on his services to the education of the country. He had a host of personal friends who will never forget him, while Canadians generally will give him the tribute of their respect and admiration for his usefulness as a great Canadian, ever alive to the true interests of the country he loved so well.

4. ELECTION OF NEW FELLOWS.

On the 15th March last, nomination papers were duly sent out in accordance with the new rule to the members of the four sections. The first section had the right to fill up the two vacancies caused by the deaths of Abbé Verreau and Dr. Marchand, and to add two additional members. The following gentlemen received a majority of votes: Hon. Thomas Chapais, M.L.C. of Quebec; Abbé Gustave Bourassa, Mr. Ernest Gagnon of Quebec, and Mr. Raphael Bellemare of Montreal. In the second section, Bishop Howley, D.D., of St. John's, Newfoundland, who has been a contributor to our Transactions on several occasions, has also received the required majority. In the third section there were four candidates nominated, but the highest number of votes polled reached only thirteen, not a majority of the section. In the fourth section there was only one nomination, Professor Adami of McGill University, who received more than the adequate majority. Under these circumstances the Council recommend the election of the candidates for sections one, two and four, and leave section three to deal with the failure to elect as it deems most expedient.

In this connection the Council calls attention to the fact that Professor MacGregor having accepted an important position in Edinburgh University, has resigned his membership in section three in the following letter to the Honorary Secretary:

April 2nd, 1902.

DEAR SIR JOHN:

The receipt of the voting paper for candidates for Fellowship in section 3 reminds me that having removed from Canada, being now *in partibus infidelium* so far as the Royal Society is concerned, it is incumbent upon me to resign my fellowship. I do so with very great regret, for though I was unable to attend the meetings so frequently as I should have liked, I am keenly sensible of having found the Society to be a perpetual stimulus to work and a welcome means of favouring and maintaining my acquaintance with the scientific and literary men of Canada.

Would you kindly express to the members of the Society the very deep regret which I feel in withdrawing from membership. With very kind regards,

Yours very truly,
(Signed). J. G. MACGREGOR.

The Council are of opinion that the Society, in accepting Professor MacGregor's resignation, should show its appreciation of his usefulness as a Fellow for twenty years by placing him on the retired list, in accordance with the practice usual in such cases.

5. DIPLOMA OF FELLOWSHIP.

In accordance with the instructions of the Society the Diploma of Fellowship, a copy of which appears in volume seven of the Transactions, has been duly engraved and distributed to all the Fellows. The Latin translation was made by learned professors of Laval University, who most kindly responded in this particular to the request of the Honorary Secretary.

6. FORM OF NOMINATION PAPER.

As the Honorary Secretary is constantly receiving applications for the proper form of nominating candidates for a fellowship in the four sections of the Society, the Council deem it expedient to give one below for the purposes of reference hereafter. Although the rule requires only the signatures of three members of a section to such a nomination paper, the practice is growing up of canvassing Fellows and adding as many names as possible in order to strengthen the chances of a candidate's election.

The Council advises that it should be an instruction to the Secretary that only three names should be appended to each nomination when submitted to the Fellows of the section for voting.

NOMINATION PAPER.

................................1900

To the **Honorary Secretary,**
Royal Society of Canada.

Sir,—We, the three undersigned members of Section .... of the Royal Society of Canada hereby propose as member of said section

.. ..

Mr. .... has published the following books or papers :

.. ..

.. ..

.. ..

Signatures. {
....
....
....

7. PREPARATION AND PUBLICATION OF ANNUAL BIBLIOGRAPHIES BY THE FOUR SECTIONS.

The Council note with satisfaction that the first steps have been taken in the preparation of scientific bibliographies by the members of the fourth section (Biological and Geological sciences).

Dr. Whiteaves gives us notes on Canadian Zoology for 1900; Dr. MacKay, a botanical bibliography for 1900; Dr. Bethune, another on Canadian Entomology for 1900; Dr. Ami, on Canadian Geology and Palæontology for 1900. Nothing has been done by the other sections in their respective spheres of study, and we express the hope that no time will be lost by them in following the useful example of the Fourth Section.

8. ASSOCIATED SOCIETIES.

The customary invitations to attend the present meeting and report on the scientific and literary work of the year, were sent to the following Canadian societies, which have hitherto co-operated with the Royal Society:

SOCIETY	PLACE	DELEGATE
Natural History Society	Montreal	Dr. F. D. Adams
Numismatic and Antiquarian Society	do	Mr. E. Lafontaine
Microscopical Society	do	
Société Historique	do	
Cercle Littéraire de Montréal	do	Mme. Cornu
Literary and Historical Society	Quebec	Mr. P. B. Casgrain
Geographical Society	do	
Institut Canadien	do	Mr. H. Chassé

SOCIETY	PLACE	DELEGATE
Literary and Scientific Society	Ottawa	Mr. W. H. Harrington
Field Naturalists' Club	do	Mr. F. T. Shutt
Hamilton Association.	Hamilton	Dr. Burgess
Entomological Society of Ontario	London	Rev. Dr. Bethune.
Canadian Institute	Toronto	Prof. Coleman
Natural History Society of St. John, N.B.	St. John	Byron E. Walker
N. S. Institute of Natural Science	Halifax	Prof. H. S. Poole
Historical Society of Nova Scotia	do	Hon. J. W. Longley
Natural History Society of B.C	Victoria, B.C	Mr. Frank Sylvester
Wentworth Historical Society	Hamilton, Ont.	Mrs. J. Rose Holden
Elgin Historical and Scientific Society	St. Thomas, Ont.	Mr J. W. Stewart
Historical Society of Manitoba	Winnipeg	Mrs. Bryce
Botanical Club of Canada	Halifax, N.S.	Dr. MacKay
American Folk Lore Society	Montreal	
Historical Society	Kingston	
Toronto Astronomical Society	Toronto.	Mr. A. Harvey
Lundy's Lane Historical Society	Niagara Falls	
New Brunswick Historical Society	St. John	
Historical Society of Ontario.	Toronto	Mr. B. Cumberland
Women's Historical Society of Toronto	do	Mrs Forsythe Grant
Niagara Historical Society	Niagara	Miss Carnochan
United Empire Loyalists' Association of Ontario	Toronto	Rev. C. E. Thomson Rev. Canon Macnab
Women's Wentworth Historical Society.	Hamilton	Miss Nisbet
Natural History Association	Miramichi	Dr. Fowler
Peterborough Historical Society	Peterborough	
Canadian Forestry Association	Ottawa	Mr. E. Stewart
Women's Canadian Historical Society	do	Mrs. G. E. Foster
Hamilton Ladies' College Alumnæ Association	Hamilton	Miss Nisbet
Natural History and Antiquarian Society of P. E. Island	Charlottetown	Mr. L. W. Watson

9. THE VISIT OF THEIR ROYAL HIGHNESSES THE DUKE AND DUCHESS OF CORNWALL AND YORK, NOW THE PRINCE AND PRINCESS OF WALES, TO THE DOMINION OF CANADA.

The following is a copy of the address which was presented in a handsome form to the Duke and Duchess of Cornwall and York, by President Loudon, on behalf of the Royal Society of Canada, on the occasion of the visit of their Royal Highnesses to the city of Toronto:

To His Royal Highness George Frederick Ernest Albert, Duke of Cornwall and York, Duke of Rothesay, Prince of Saxe-Cobourg and Gotha, and Duke of Saxony; Earl of Carrick and Inverness, Baron of Renfrew and Killarney, Lord of the Isles and Great Steward of Scotland, K.G., P.C., K.T., K.P., G.C.M.G., G.C.V.O., LL.D., D.C.L., &c., &c.

MAY IT PLEASE YOUR ROYAL HIGHNESS:

The members of the Royal Society of Canada have the honour on the present occasion to give expression to the deep sentiment of devotion to the Crown and Empire, which they feel in common with all classes of the Canadian people, and to add their humble tribute to the National welcome which is being extended with such joyous acclaims to Your Royal Highness, and

Her Royal Highness the Duchess of Cornwall and York, on this auspicious tour of the Dominion.

It will be of interest to Your Royal Highness to know that the Royal Society, which represents a happy union of French and English Canadians for the promotion of science and literature, was founded by the present Duke of Argyll, when Governor-General of Canada, and owed much of its success at its very commencement to the sympathy which it received from Her Royal Highness the Princess Louise, who did so much during her residence among us to encourage the literary and artistic development of this relatively new country.

Representing, then, the two great national elements of the country, the Royal Society venture the opinion in all confidence that the people of the Confederation will be stimulated even to greater efforts in the future whenever the Empire demands sympathy and aid, and that they will feel drawn still closer by ties of affection to the Throne by this visit of Your Royal Highness to a Dominion which owes so much of its political strength and material advancement to the admirable system of government established during the reign of the great Queen, whose memory is so deeply enshrined in the hearts of all Canadians.

(Signed), J. Loudon,
President.

(Signed), Jno. Geo. Bourinot,
Honorary Secretary.

To this address a reply was received in due order from His Royal Highness the Duke of Cornwall and York, through his Honour the Lieutenant-Governor of Ontario.

10. A Tribute to Sir Daniel Wilson.

In meeting for the first time in the city of Toronto, the Council cannot refrain from referring to the fact that one of the most active and earnest founders of the Royal Society was Sir Daniel Wilson, for many years president of the great university which has given us such admirable facilities on the present occasion. His sympathy with the aims of the Society was of that practical character which has made it a most useful factor in the intellectual development of Canada. We can easily imagine how warm would have been his greeting to the members of a body of whose success he had never a doubt, had death spared him for a few years longer to the Canadian people; but though he is no longer with them, the original members of the Society, who met him so often, will always have for him a tender recollection which is naturally intensified when we meet for the first time within the walls of a learned institution over which he presided with such signal ability during the best years of a career, notable for an industry, a versatility and breadth of thought, which made him a powerful factor in the higher education of the Dominion.

11. THE PRESERVATION OF PLACES OF SCENIC AND HISTORIC INTEREST.

The Council find it expedient to call attention once more to the recommendation which they made at the nineteenth meeting of the Society, that a Canadian Committee be formed for the preservation of places of scenic and historic interest within the Canadian Dominion. For the information of those persons who have not read or paid much attention to that portion of the Council's report in 1901, the Council ask permission to repeat the most material sentences of their recommendation.

"Canada has a deep interest in the formation of such an association, and the Council believe that the Royal Society of Canada, essentially a national representation of the two great French and British nationalities, should take the lead in a movement so eminently calculated to stimulate a truly Canadian spirit among the races who possess the Dominion. It is proposed that a Committee be formed from the first and second sections of the Royal Society to be called 'The Committee for the Preservation of Scenic and Historic Places in Canada,' and that this body should communicate with all historical societies throughout the Dominion and ask each of them to nominate one member to act in connection with the Royal Society's Committee. It would be the object of this Committee to obtain accurate information of the matter under their cognizance, and take such measures without delay as would be necessary to carry out the aims for which it has been formed. This Committee being composed of all historical bodies interested in its objects, would be able to work intelligently and energetically. It would report on the work they may have done throughout the year to the general meeting of the Society. A small grant of one hundred dollars or more should be available for this Committee whenever it would be necessary to have a special examination and reports made on some place of interest by a member of the Committee, whose knowledge would make him specially qualified to deal with the subject. The Council only attempts at present to outline the primary aims of the Committee, whose duty it will be to look thoroughly into the whole *raison d'être* of their existence, and make themselves a thoroughly effective organization in every respect."

As a number of the historical and literary societies are represented at this meeting, the Royal Society hope that they will take a direct interest in the work of a Committee whose objects seem in every respect so desirable.

The Council have much pleasure in stating that already a practical step has been taken in connection with this Committee.

An able French Acadian, Senator Pascal Poirier, a Fellow of the first section has, at the request of the Council, paid a visit to the ruins of the historic town and fortress of Louisbourg, on the eastern Atlantic coast, and will lay before the Society the results of his interesting and valuable investigations.

Senator Poirier also in the Senate drew "the attention of the Government to the state of dilapidation and ruin in which the ancient fortresses, the old battlefields and historic sites of Canada are to be found" and inquired "whether the Government propose to take some measures for their preservation." After his interesting speech, replete with valuable historical facts and some remarks on the same subject by Senators Church and Macdonald (Prince Edward Island), Hon. Mr. Scott, leader of the Government in the Upper House, spoke as follows:—"My hon. friend from Acadia has brought under the notice of the Senate a most important subject, and I am quite sure that his remarks, and the remarks of my hon. friend from Lunenburg and my hon. friend from Charlottetown, will be read with very much interest by the people of Canada. He has chosen a most opportune period for bringing it under the notice of the Senate and the people of this country, inasmuch as just at this moment there is a patriotic sentiment prevailing over Canada, and I think an anxious desire that we should preserve those monuments which point to the heroism of those who have gone before us, and to whose services we practically owe the preservation of Canada as our country to-day. I will have very great pleasure in drawing the attention of the Minister of Militia to the remarks made by the hon. gentlemen who have spoken on the subject, and I have no doubt that the people of Canada would approve of a very liberal expenditure for the preservation of those monuments. In drawing the attention of the Minister of Militia to the motion, he informed me that he was giving it attention, and that the present year a considerable sum would be spent to preserve monuments in and around Quebec. How many other places he intended to spend money on I am unable to say, but I think, after reading the patriotic speeches made by my hon. friends opposite, he will be disposed to ask for a more liberal grant than he originally intended."

12. Archives.

Owing to the illness of the Archivist, Dr. Brymner, the usual summary does not appear in the annual report for the year 1901, but the Calendars for Lower and Upper Canada are given. The Calendar for Lower Canada contains the correspondence of Lord Gosford appointed Governor-General and Commissioner to investigate the grievances complained of. The report of the Commission in four volumes has been copied and placed on the shelves. The Calendar for Upper Canada contains the correspondence of Sir John Colborne, afterwards Lord Seaton, with the Colonial office, during the last period in which he held the office of Lieutenant-Governor, and also despatches from Sir Francis Bond Head and part of those sent by the Colonial office to him in 1836.

13. A SYSTEM OF TRIANGULATION ALONG THE 98TH MERIDIAN.

Professor McLeod has again called the attention of the Honorary Secretary to a subject worthy of the earnest attention of the Royal Society in the following letter which explains itself:

McGILL UNIVERSITY, MONTREAL.

MONTREAL, May 16th, 1902.

SIR J. G. BOURINOT, K.C.M.G.,
Ottawa, Ont.

DEAR SIR :

You will remember that Dr. Pritchett, then Superintendent of the Coast and Geodetic Survey of the United States, attended a meeting of the Royal Society in 1898, for the purpose of calling the attention of the Society to the desirability of extending the triangulation along the 98th meridian—which was then approaching completion in the United States—northwards through Canada. The Mexican Government had at the time undertaken to extend it southwards to the Pacific Ocean, and this work is now in progress.

A Committee of Section III. was appointed for the purpose of urging upon the Government the importance of this work, and a memorial was prepared and presented to the Governor-General-in-Council, through yourself. So far as I am informed, no reply to this memorial has been received by the Royal Society or by Section III., and it has occurred to me that possibly you might desire to draw attention to the importance of the work in your report, and perhaps obtain from the Minister of the Interior any opinion he may have in regard to the desirability of carrying it out. In case you desire to make some reference to the subject, you will perhaps find my address, as President of Section III. in 1899, of assistance to you.

I propose to base upon such report as you may make, a request to Section III. to again draw the attention of the Government to the importance of the work.

I am,
Yours very truly,
C. H. McLEOD.

14. ETHNOLOGICAL WORK IN CANADA.

At the Liverpool meeting of the British Association for the Advancement of Science a Committee was nominated for the purpose of initiating an ethnological survey of Canada on lines corresponding with those already followed by the Committee for the Ethnological Survey of the United Kingdom, as well as to continue, as far as possible, work of the same nature carried on in Canada since the Montreal meeting in 1884 by the Committee for the Northwest Tribes of Canada under the chairmanship of Dr. George M. Dawson, The Committee as appointed comprised three members of the Committee on an Ethnological Survey of Great Britain, and fourteen resident Canadian members. In the five years which have now elapsed, the Canadian representation has undergone marked changes through death and the consequent addition of new members, and the most serious loss thus sustained, has been through the death of Dr. George M. Dawson, to whose especial interest and ability in ethnological work we have been chiefly indebted for the progress made up to the time of his death.

At the Toronto meeting of the British Association, a special grant was made in aid of the work of the Committee, and with the means thus placed at its disposal it became possible to procure necessary instruments for physical measurements, to distribute printed instructions for the guidance of observers, and to give practical assistance to certain observers where most needed. Each year since then there has been a continuation of the grant, but in diminishing amount, and it is a question if the British Association can be expected to much longer continue to extend financial aid to the committee which receives no similar support from the communities which are directly interested in a continuation of such an important line of work. In addition to such assistance, the British Association has also published annually, the scientific results obtained by various members of the Committee. This has been accomplished at considerable expense, and that it has been done in the face of great difficulties, is most gratifying evidence of the appreciation of the work so far accomplished.

The lines laid down by the Committee at the Toronto meeting, along which the work of the Committee might profitably proceed, were as follows: —

1. Physical types of the inhabitants.
2. Current traditions and beliefs.
3. Peculiarities of dialect.
4. Monuments and other remains of ancient culture.
5. Historical evidence of continuity of race.

As applied to Canada, inquiry along any one of these lines was to have special reference to

a. The white races.

b. The aborigines or Indians.

The work so far accomplished has included important contributions to our knowledge of the early French settlers in Canada, by Mr.

B. Sulte; an exhaustive and accurate study of the Indians of British Columbia, by Mr. C. Hill-Tout, still in progress; The Huron Indians of Lorette, by Mr. L. Gérin; important data on the growth of children, by Dr. Franz Boaz, Prof. E. Tracy and others; and physical measurements of adults, representative of people of diverse affinities and environment. Much of this last material awaits a fitting moment for elaboration, when sufficient data shall have been collected to justify the formation of conclusions. In addition to this work, mention should be made of the valuable studies carried on under the auspices of the Minister of Education for Ontario, as embodied in the archæological reports issued under the editorship of Mr. David Boyle. These reports supplement the work of this Committee along just those lines on which co-operation is desired.

In the report of the Committee for 1900, attention is directed to the great importance of securing ethnological data with as little delay as possible. "While this is eminently true with respect to the white population which is experiencing new and marked changes almost every year, in consequence of the introduction of foreign elements, often in large numbers, it is particularly true with respect to the native Indian population. In many localities the original blood has become so modified by intermarriage with whites that it is often a matter of great difficulty to find an Indian of pure blood. Proximity to settlements of white people has resulted in a more or less profound impress upon the social life and tribal customs, which are fast becoming obsolete and forgotten. The old chiefs who have served as the repertories of traditionary knowledge are rapidly passing away, and with their death there disappears the last possibility of securing reliable data of the greatest value." What was true two years since has been emphasized more recently in very striking ways. In addition to the changed and rapidly changing conditions of research as applied to the Indian population, the white population is undergoing changes at an accelerating rate in consequence of the greatly increased influx of foreign elements — factors which are bound to produce a more or less profound impression upon the character, traditions and social customs of the various communities among whom they settle, within a few years. It is therefore desirable to once more strongly emphasize the pressing necessity for some more definite and concerted action whereby the work entrusted to the Committee of the British Association may not only be prevented from discontinuance, but that it may be given additional support through the co-operation of the various provincial governments. The greatest difficulties encountered by the Committee up to the present time, have been found (1) in the lack of funds necessary to carry on their work, and (2) in the lack of competent and enthusiastic observers. The first difficulty is by far the more serious, and could it be overcome, there would be comparatively little difficulty in meeting the second. While competent observers are numerically few, it is also true that those who might be selected are usually not in a position personally to meet the often very heavy expenses attendant upon long journeys and other items necessarily incidental to the acquisition of desired information. It, therefore, becomes evident that under present conditions, the work of the Committee cannot expand beyond very narrow limits, and it may be that even that must terminate after a few years.

The Committee have had under consideration for some time, a plan whereby the various provincial governments might co-operate to secure the desired result. Briefly stated, it is as follows: —

The present Committee of the British Association or such reorganization of it as may be found desirable, should form a central committee for the entire Dominion, in whose hands should be placed the control of a comprehensive ethnological survey of the entire population. Each province should contribute a certain proportional share to the working expenses of this Committee, and should undertake to establish a museum relating to the ethnology of its own territory. By exchange with one another, each museum would thus become a more or less complete exponent of the ethnology of that particular province, while, at the same time, indicating its ethnological affinities with all the others. In return for the financial assistance granted, the Committee would give to the museum of each province, the original or duplicate of each article or photograph obtained by a study of the people within that province, while any further duplicates could be transmitted to the English section of the Committee to be deposited in the British Museum or such other place as might be selected.

The work at present conducted by Mr. David Boyle, under the auspices of the Department of Education for Ontario, is a step in this direction, and if the initiative of Ontario were followed by the other provinces, and the entire work were systematized under a central Committee as suggested, great good might result.

The Royal Society of Canada is the most representative and influential body of its kind in Canada, and it is believed that if it were to lend its influence in the direction of making suitable representations to the various provincial governments, it might be possible to place the very important work of ethnological research upon a basis of permanent usefulness.

15. INTERNATIONAL CONGRESS OF AMERICANISTS.

The Honorary Secretary has received the following communication on a subject of special interest to the members of the First and Second Sections of the Royal Society:

NEW YORK CITY, November 30th, 1901.

SIR :

We have the honour to inform you that in accordance with a vote at the last Session of the Congress, held in Paris in 1900, the Thirteenth Session of the International Congress of Americanists will be held in the halls of the American Museum of Natural History, in the City of New York, beginning at noon on Monday, the 20th, and continuing until Saturday, the 25th day of October, 1902.

The object of the Congress is to bring together students of archæology, and early history of the two Americas, and by the reading of papers and by discussions to advance knowledge of these subjects.

You are respectfully invited to join the Congress, to present papers for its consideration, and if possible to be present at the Session and take part in the proceedings.

Hoping for your efficient aid and co-operation in the important objects of the Congress, we beg you to accept our expression of deep respect.

(Signed), MORRIS K. JESUP,
President of the Commission of Organization.

M. H. SAVILLE,
General Secretary, Commission of Organization.

All persons interested in the study of the archæology, ethnology, and early history of the two Americas may become members of the International Congress of Americanists by signifying their desire to the General Secretary of the Commission of Organization (Mr. M. H. Saville, American Museum of Natural History, City of New York, U.S.A.) and remitting either direct to the treasurer or through the general secretary, the sum of three dollars in American money. The receipt of the treasurer for this amount will entitle the holder to a card of membership, and to all official publications emanating from the thirteenth session of the Congress.

Communications may be oral or written, and in French, German, Spanish, Italian, or English.

The council will decide upon the time allowed for each communication. No single paper shall exceed thirty minutes in delivery.

All debates are expected to be brief, and will be within limitations determined by the presiding officer of the day. All papers presented to the Congress will, on the approval of the Bureau, be printed in the volume of Proceedings.

All members of the Congress are expected to send in advance of the meeting, the titles, and, if possible, abstracts, of their papers, to the General Secretary.

The subjects to be discussed by the Congress relate to:—

I. The Native Races of America; their origin, distribution, history, physical characteristics, languages, inventions, customs, and religions.

II. The History of the early Contact between America and the Old World.

16. THE MONTGOMERY MEMORIAL.

The public indignation which was evoked in various parts of Canada at the proposal to erect a memorial at Quebec in honour of General Montgomery, has had the satisfactory effect of bringing about the withdrawal of the offer made by the relatives in the United States for the placing of a tablet on the rocks of the ancient capital. Consequently an irritating subject, for the time being, happily disappears from the arena of public discussion, and no longer serves as a factor for creating an unsatisfactory feeling between communities who should cultivate the most friendly relations between each other and allow the past, with its passions, prejudices and animosities, to be buried in oblivion.

17. SURVEY OF TIDES AND CURRENTS IN CANADIAN WATERS.

This survey, which is under the direction of Dr. W. Bell Dawson, F.R.S.C., continues to make substantial progress. An important series of observations on the Lower St. Lawrence was obtained in 1900; and the results derived from these are now given in a complete form in the annual report last issued. Further tidal observations were obtained last season in Northumberland Strait and Cabot Strait, which will serve to improve the accuracy of the tide tables for Charlottetown and Pictou. Observations of the currents have also been secured in the regions in which tidal observations were taken, so far as there has been opportunity.

Tide tables continue to be issued regularly for the principal ports of eastern Canada; and the basis from which these are calculated is being extended by utilizing the further observations from year to year. In addition to these, tide tables are now issued for Victoria, in British Columbia, and Sand Heads, in the Strait of Georgia. The tidal relation of Vancouver to Sand Heads has been determined by observations last season; and data have also been obtained for the turn of the current in First Narrows, which leads into that harbour.

The central position of Sand Heads, in the Strait of Georgia, makes it eminently suitable as a port of reference for other harbours throughout that strait. The only data previously available were those given in the tide tables issued by the United States Coast Survey, which are based upon comparison with Puget Sound, where the type of the tide is different in character from the Strait of Georgia. These data were far from satisfactory; and the only means of securing an improvement, was to obtain observations in the region itself. This has now been done; and the result will be further improved and extended as time goes on. These new tide tables and the accompanying information are much appreciated on the Pacific coast.

At all the stations where observations are taken, the levels are recorded permanently by reference to bench-marks. These will be invaluable when they come to be connected by some general system of levelling. In the meantime, they are of immediate use locally, in enabling the true level of high and low water to be known, for the purposes of construction in harbours, and for city works, such as drainage. At the head of the Bay of Fundy, a good datum level is afforded by the Chignecto Marine Railway. Last season, extended levels were run around Cumberland Basin, to connect with this datum a number of important observations of exceptional high waters. The resulting range of the tide was also correlated with observations taken by the Admiralty in 1859 in the other arm of the Bay of Fundy, namely, at Noel Bay, in Minas Basin. In this way the extreme height of the tide is definitely known, which is valuable in preventing the flooding of the extensive dyked marshes in these regions. The main object of the work was to determine the astronomical conditions under which exceptional high water occurs; and to bring this within the scope of prediction.

On the Lower St. Lawrence, the turn of the current in relation to the time of high and low water had been determined at several points, while the latest Admiralty surveys of the St. Lawrence were made from 1885 to 1889; but, unfortunately, the time of the tide itself was not known, as there were then no tide tables for the St. Lawrence to refer to, or any data by which it could be ascertained. By the tidal observations of 1900, the requisite data for the tide itself have been secured, and this enables the turn of the current also to be known. The information formerly obtained by the Admiralty is thus made practically available to mariners for the first time. The localities for the tidal observations were carefully chosen with this object in view.

It has become evident that from a tidal point of view, the St. Lawrence may be divided into two regions. From the head of tidewater at Lake St. Peter to the Traverse, which is a little below Orleans Island, the tides and currents can best be referred to Quebec. Below this, in the open estuary as far as Anticosti, and in Chaleur Bay, the tides are more advantageously referred to the principal tidal station at Father Point. This accords with the natural features of the estuary, as the deep water runs up as far as the Traverse; and Quebec must be considered as in the river, about the true head of the estuary. It is also just below Orleans Island that the tide has its maximum range and the currents their greatest strength.

To carry out this sub-division practically, it is evidently necessary to have tide tables for Father Point itself. With this object, the difference in the time of the tide between Father Point and Quebec, as given by two complete years of simultaneous observations, was carefully examined into. The observations gave the difference in time for 1260 consecutive tides; and it was found that this difference varied during the course of the month, the variation being greater in the case of low water. This variation was of a double character, firstly, in the period of the synodic month with the moon's phases; and secondly, in the period of the anomalistic month with the moon's distance. The total amount of the variation for the low waters, was 41 minutes more or less than the mean value. In the endeavour to obtain a tidal difference with less variation than this, trial comparisons were made with Wilhelmshaven, Germany; Harwich, on the North Sea; and Portsmouth, on the English Channel. The tide in each of these harbours is similar to Father Point, in having nearly the same range; and it might therefore be expected that one of these differences would prove to be more nearly constant than the difference with Quebec. This was not the case, however; but by an analysis of the difference in terms of the two periods above mentioned, a double series of variable differences were obtained by which the tide at Father Point can be correctly calculated from the tide tables for Quebec. The series used are given in full in the present report. This is the best method available until this Survey can afford the cost of determining tidal constants for Father Point itself, from the record which has already been secured there.

This investigation is of interest as an example of the use of variable tidal differences. These have been much employed by this Survey in the calculation of local tide tables from ports of reference. It may never be practicable to secure direct astronomical data for every port in a country for which tide tables are needed; but by means of tidal differences which vary in the period of one of the astronomical months, results of a satisfactory degree of accuracy can be secured, and the multiplication of the more expensive permanent tidal stations may be avoided. As another example, it has been found in Northumberland Strait that the leading variation in the difference follows the declination of the moon, or the period of the nodal month. The variations in terms of the phases and the distance of the moon are relatively small. Again, in the Bay of Fundy, the moon's distance has as much effect on the height of the tide as its phases; that is to say, the difference in the range of spring tides at Apogee and at Perigee is as great as the difference between the mean range of neap tides and the mean range of spring tides, the amount in each case being close upon 11 feet. These variations are detailed in the present report. It is thus evident that each region must be investigated for itself, to determine the period in which the dominant variation takes place.

By this general method, the characteristics of the tide in any particular region are first allowed for, in the tables calculated astronomically for the principal station. The tides for other localities in the region are then calculated by means of a variable difference in time, from this principal station; and it has usually been found that a variation in some one period includes so large a part of the whole, as to give a result sufficiently accurate for practical purposes. In one instance above cited, however, a further plus and minus correction was used in a second period over-running the first, to allow for another variation next in importance. With such variable differences, a result that is practically correct is secured, which would not be the case with the old method of using a constant difference. Formerly, the discrepancy was often large, as in Northumberland Strait, where the time of the tide as found by a constant difference from an Atlantic port was as much as 1½ hours early or late at certain parts of the month.

The tide at Quebec was also computed formerly by a constant difference in time from London, England. This may serve to indicate the substantial improvements in accuracy already secured by this Survey.

The total expenditure on this Survey during the fiscal year from June 30th, 1900, to June 30th, 1901, was $7,060.20. This total expenditure is classified as follows:—

(1) General expenses; maintenance of the seven principal tidal stations, with repairs, heating, and supplies; salaries of observers and assistants; office work and travelling expenses, $2,910.35.

(2) Summer tidal stations, on the Lower St. Lawrence in 1900, and in Northumberland Strait in the early part of the season (up to June 30th) 1901; erection of gauges, salaries of observers, and inspection, $1,503.25.

(3) Tide tables, calculations and printing; analysis of further tidal records, to improve their accuracy, which is of permanent benefit for all future years, $2,646.60.

The report is illustrated by an outline map and two series of tidal curves from the self-registering gauges of 1900. These are of special interest in affording simultaneous comparison of the type of the tide throughout the Lower St. Lawrence, from the mouth of the estuary to the point of maximum range.

18. Marine Biological Station of Canada.

The past year (1901) has been, in one noteworthy respect, the most important in the history of the Marine Biological Station, for it witnessed the completion of a series of scientific reports which have now been printed as a supplement to a Government blue book, under the title of "Contributions to Canadian Biology, being Studies from the Marine Biological Station of Canada, 1901." This selection of seven original papers, embodied in the Supplement to the 32nd Annual Report of the Department of Marine and Fisheries, Fisheries Branch, affords ample proof of the valuable and energetic work which has been carried on in this seaside laboratory during the three years of its existence.

The variety and scope of the researches, in which the scientific staff have been engaged during that time, may be gathered from the titles of the articles referred to, which are as follows:—

(1) Account of the Marine Biological Station of Canada, its Foundation, Equipment and Work, by Professor Edward E. Prince, Dominion Commissioner of Fisheries, Director of the Station.

(2) The Effects of Polluted Waters on Fish Life, by Dr. A. P. Knight, Professor of Animal Biology, Queen's University, Kingston, Ont.

(3) The Clam Fishery of Passamaquoddy Bay, New Brunswick (with four plates), by Dr. Joseph Stafford, Department of Zoology, McGill University, Montreal.

(4) The Flora of St. Andrews, New Brunswick, by Dr. James Fowler, Professor of Botany, Queen's University, Kingston, Ont.

(5) The Food of the Sea Urchin (Strongylocentrotus), by Dr. F. H. Scott, Physiological Laboratory, University of Toronto.

(6) The Paired Fins of the Mackerel Shark (Lamna), with three plates, by Professor E. E. Prince, Dominion Commissioner of Fisheries, and Dr. A. H. MacKay, Superintendent of Education for the Province of Nova Scotia, Halifax, N.S.

(7) The Sardine Industry in Relation to the Canadian Herring Fisheries, by Arthur Bensley, B.A., &c., late Fellow in Biology, University of Toronto.

As Professor Prince states in a brief prefatory note, this publication represents part only of the work done by the staff of specialists at St.

Andrews, New Brunswick, and several faunistic and embryological investigations were carried on, which are not sufficiently advanced for presentation in permanent form at this stage.

During the past twelve months the station has been located upon a new site, and the scientific workers have been conducting researches in a more northern area, viz., the waters of eastern Nova Scotia, including Chedabucto Bay, and that important outlet of the Gulf of St. Lawrence, the Strait of Canso. The station was removed to this northern site after two most successful seasons (1899 and 1900) at St. Andrews, New Brunswick, this step being in accordance with the decision of the Board of Management at the semi-annual meeting held in St. Andrews, in July, 1899.

It may be noted that this Canadian station was designed in the form of an ark or oblong building placed upon a large scow, so that it could be moved from one point to another along the coast, as the Board of Management might from time to time determine. At each chosen location it might be either moored, or hauled up on dry land above high water mark, thus fulfilling the conditions of a floating as well as of a fixed scientific station. The building during its first two seasons was not placed upon the scow, but was erected on the shore at St. Andrews, New Brunswick, with the intention of having it placed upon the special scow whenever the Board of Management decided to move it away to a new locality. The laboratory was completed in June, 1899, and is a neat one-story structure of wood, well lighted from the roof and sides, and somewhat resembling a Pullman car, with a row of eight large windows along each side, and a door with sash provided with plate glass at either end. Its total length is 50 feet, the principal room, or main laboratory, occupying the central part of the structure and forming a well-lighted and cheerful work-room, measuring 30 feet in length, and 15 feet in breadth. Two tank and store-rooms are at the anterior end, each room 6 feet by 6 feet, while at the opposite end are four rooms, one reserved for the director, another, adjacent to the director's, devoted to the use of the attendant, and provided with a sink and spacious shelving, and certain kitchen appliances, while on the opposite side of the passage are two rooms, one used as a tank room, and the other as a chemical room, the last being provided with a table for chemical balances and other instruments, and with shelves for storing chemicals and re-agents. Of the eight windows on each side, half of them light up the main work-room. On the roof, which is slightly elevated in the centre, is a neat raised ventilator, or skylight, with nine movable panes on either side to admit light and fresh air. The scow on which the laboratory was placed in the spring of 1901 is sixty feet in length and nineteen and a half feet in breadth, and about nine feet from the deck to the outside of the bottom planking, that is, in vertical depth. It provides a narrow platform round the sides of the building, and a spacious platform at each end, six and a-half feet in width. A small double-acting brass deck-pump placed on the platform at the front entrance is connected by hose pipe with the fresh-water tank, and supplies the porcelain wash-basins, one of which is provided at each worker's table. Near the location selected, at some little distance from the station, and adjacent to the sea shore, a salt-water pump, with a Rider hot-air engine, 6 in. cylinder, are placed, and connection is made by a pipe with a spacious salt-water tank on the roof of the building at the anterior end. From this tank a delivery tube, one inch in diameter, of galvanized iron, passes close to the skylight into the interior of the station, immediately under the horizontal cross beams of the roof, giving off lateral branch tubes, five on each side, and supplying the salt water by special nozzles to the respective porcelain basins used by each worker. From this delivery tube, temporary tanks can be supplied as required, and the final outflow empties into the salt-water tank in the tank-room next to the chemical room, at the rear end of the station. Along each side of the laboratory, under the workers' tables, a convenient drain carries away waste water, and has its exit beneath the laboratory. The station possesses a gasoline launch, 22 ft. long, fitted with a Sintz engine, intended to be used for conveying the workers conveniently to points within easy reach. It was originally planned that this launch, which is 2½ h.p., should be utilized for bottom dredging, and for surface or mid-water tow netting with capacious "plankton" and other nets; but it has proved to be not well adapted for that work, on account of its insufficient power. A handy little row-boat was also purchased for the use of the staff. The equipment of the station includes a number of dredges of various sizes, a drag seine 60 ft. long, two large triangular nets after the Scottish model, designed by Professor McIntosh, a beam trawl 15 ft. across, and a number of fine silk and cheese-cloth tow-nets and dip nets. In addition to a number of Agassiz store-tanks, a series of copper store-tanks of various sizes have been procured.

While there is, of course, much to be added to the equipment, many of the workers have expressed themselves as well pleased with the provision in the way of nets and other necessary apparatus; but the desirability of the purchase of a tug or launch of some power, for deep sea dredging, has pressed itself upon the attention of the Board. It is to be hoped that at an early date a suitable vessel will be secured.

The superior advantages of a movable building over one permanently fixed, are readily seen, as a floating station can be towed from one centre of investigation to another with facility, and this is an obvious gain, especially when the coast to be investigated is so extensive and varied as that of the Atlantic seaboard of Canada. A fixed station on land, while advantageous for minute microscopical, physical and chemical studies, on account of the absence of vibration, has the serious disadvantage of confining the work to a limited area and affording direct and convenient access to a portion of the coast only, viz., that portion immediately adjacent to the site of the building. This disadvantage has been acutely felt in some European and United States scientific stations, and, even at the famous Zoological Station at Naples, it has been found that, in certain lines of research, the available materials for study became scarcer and more difficult to obtain as the years went by, and costly steam-boats, fitted up as scientific laboratories, have been found necessary to overcome this great difficulty. It is clear that a floating station ensures the readiest opportunity for scientific investigations, during the same season and during successive seasons, along different portions of the coast, and the waters adjacent thereto. The Canadian station combines in a unique manner the features of both types of laboratory—the fixed and the floating type—for, in accordance with a suggestion originally put forth by the director of the station, Professor Prince, the building has been so devised as to admit of being readily drawn up above high-water mark at the end of each voyage, and there so securely fixed on the beach, as to furnish all the most desirable conditions of a land location. This idea of the Director has worked well, and it is probably the first biological station in existence which embodies this dual character of the floating and fixed marine station.

The transference by water from St. Andrews to Canso, early in the season of 1901, was accomplished successfully, but was not without its perils. Under the careful and skilful superintendence of Captain J. H. Pratt, of the Dominion fisheries cruiser "Curlew," the trip was made without any mishap. The voyage of four or five hundred miles was a somewhat hazardous undertaking, as the distance is much greater than the station is ever likely to travel at a single trip again, and the exposed nature of the coast and the unfavourable time of the year (early spring) combined to make it a notable excursion for a craft not built for long voyages. On arrival at Canso the station was at once beached and placed in position at the east end of the town of Canso.

At the usual half-yearly meeting of the Board of Management, held in the office of the Commissioner of Fisheries in Ottawa, on February 20th, 1901, an Assistant Director was nominated, viz., Professor Ramsay Wright, whose appointment was sanctioned by order-in-council, dated March 12th, 1901, and authority was also given for the engagement of a Senior Curator to act for the whole season, instead of the previous system of appointing monthly curators, selected in succession from the junior members of the staff during each season's operations. For the year 1901 Dr. Joseph Stafford, of Toronto University, and now a member of the staff of McGill University, was appointed to the office, and he proved himself to be an able and efficient assistant.

Amongst the scientific men who occupied tables in the laboratory during the season of 1901 were Professor Ramsay Wright, Toronto University; Professor A. P. Knight, Queen's University, Kingston; Professor A. B. Macallum, Toronto University; Professor Fowler, Queen's University; Dr. Joseph Stafford, McGill University; Mr. C. McLean Fraser and Mr. George A. Cornish, of Toronto University; Dr. Linville, of New York; and Professor Prince, Commissioner of Fisheries, Ottawa.

Very elaborate Plankton investigations were carried on month after month by Professor Wright, from May to October. Some most important experiments, on the effects of dynamiting fish, were conducted by Professor Knight, while Professor Macallum continued his abstruse researches on the chemistry of *Aurelia* and other *Medusæ*. Dr. Stafford pursued, without cessation, faunistic studies, having completed in 1900 a very inclusive list of the marine animals (vertebrate and invertebrate) of Passamaquoddy Bay, with many new additions discovered and determined while the station was at St. Andrews. A number of remarkable fishes were examined by the staff, including Scomberoids, not generally considered to belong to the North Atlantic fauna. A specimen of *Carcharias littoralis,* the blue or sand shark, and an example of *Orthagoriscus* (the sunfish) were procured. Some very valuable preparations for permanent museum purposes were made of these specimens by the junior assistants in the station.

By the kindness of Messrs. A. N. Whitman & Sons, of Canso, beam-trawl experiments were carried on in Chedabucto Bay; but the results were only partially successful. The dredges and floating tow-nets yielded, however, abundant material for study, and some elaborate reports and papers, on the observations made and the specimens procured, are in course of preparation for publication.

Unlike most of the United States biological stations, in which elementary and advanced teaching is provided, and a large part of the work done is of the nature of school instruction, the Canadian station gives no instruction in biology, and admits only qualified workers who have been prepared by university training for conducting original and independent researches. The marked success of the station during the first three years of its operations proves that Canada has no lack of scientific men, able, energetic and willing to advance scientific discovery, if adequate and congenial means for so doing be provided.

The Canadian Government has generously provided the opportunity and the means, and it is open to qualified naturalists without fee or charge to take full advantage of the resources of the marine biological station. The institution is now on a permanent basis, and it is not too much to anticipate that the publications issued from this biological station year by year will be of the highest value to the Dominion and of the greatest importance to the scientific world generally.

19. MONUMENT TO LIEUTENANT-GOVERNOR SIMCOE.

The Honorary Secretary has received the following letter from the Reverend Charles E. Thomson, M.A., Chairman of the Committee entrusted with the duty of erecting a monument to the first Lieutenant-Governor of Upper Canada. The Royal Society entertain the hope that the Canadian Government will assist a project so worthy of the support of all patriotic Canadians.

CARLTON WEST, ONT., April 25th, 1902.

MY DEAR SIR JOHN :

The monument to Col. John Graves Simcoe, political founder of Upper Canada, is so far completed that the clay model has been inspected and approved by the Committee, and also by a select Committee of the Guild of Civic Art, Toronto, comprising Frank Darling, Wyley Green, and B. E. Walker, of the Bank of Commerce. I am sorry to say that the statue, which is about nine feet high, will have to be cast in the United States. I think we ought to be able to do it in Canada.

The total cost, including a suitable pedestal, is estimated at about $5,500; it may be a trifle more or less. The city of Toronto has subscribed and paid $1,000, the Provincial Government has given a site near the south-east corner of the Parliament building, about the best site except where Sir John A. Macdonald is right in front, and has also subscribed $3,000, which we hope to get as required, so soon as we have made provision for the pedestal. We expect the $4,000 will pay for the statue itself, and are now wanting about $1,500 for the pedestal and erection of the statue. Already $250 has been guaranteed by one person in Toronto, if we can get the rest. We venture to hope that the Government of Canada will help us in this matter, as I understand it helped Montreal and the province of Quebec by contributing liberally to the Maisonneuve Monument.

My special object in writing to you is to ask you if you can find the record of this contribution to the Maisonneuve Monument, and if you will kindly send me a memorandum of it.

As the Royal Society is to meet in Toronto this year, I trust we may have the pleasure of seeing and hearing you. The U.E. Loyalist Association, I am happy to say, seems to be gaining ground, and in the best way, namely, by attracting the attention of people in various districts of the province, and

leading them to form local branches. A branch, which promises to be a strong one, has just been formed at Hamilton, which we call, in old-fashioned style, "The Head of the Lake Branch."

Believe me,
Yours very faithfully,
(Signed), C. E. Thomson.

Sir J. G. Bourinot, K.C.M.G., &c., &c.
Ottawa, Ont.

20. Wireless Telegraphy.

The Royal Society has observed with pleasure that the Government is showing an ample appreciation of the work of Signor Marconi, and that Canada has taken an active part in encouraging progress in applied science.

It had been hoped that Signor Marconi would have been with us at this meeting of the Royal Society, he having promised to attend should his engagements allow of his presence in the country. We regret, however, that he has been unable to accept the invitation of the Society.

General Business.

On motion of Dr. Fletcher, seconded by Rev. Dr. Bethune, the Minutes and Proceedings of the general meeting of 1901, as printed in the last volume of the Proceedings and Transactions (Vol. VII.), were approved and confirmed.

Moved by Prof. Penhallow, seconded by Prof. Macallum: That the recommendation of the Council concerning ethnological work in Canada be referred to Section II. for consideration and report during the present meeting of the Royal Society.—*Carried.*

Moved by Dr. Bovey, seconded by Dr. Johnson: That the matter of the tidal observations be referred to Section III.—*Carried.*

On motion of Dr. Johnson, seconded by Sir James Grant, the report of the Council was adopted.

On motion of Dr. Burgess, seconded by Dr. Goodwin, it was resolved that the President of the Society, Dr. Withrow, Dr. Dionne, Sir Sandford Fleming, and Dr. Saunders, be a Committee to make nominations for officers of the Society for the ensuing year.

Reports of Associated Societies.

The delegates of affiliated societies were then called upon for their annual reports, all of which appear at length as Appendix B.

At this session reports were read from the Ontario Historical Society by Mr. Barlow Cumberland; Women's Canadian Historical

Society, Mrs. Forsythe Grant; and Institut Canadien, Quebec, Mr. Chassé.

It was announced that a reception by the Faculty of Toronto University would be held in the evening after the President's address.

The meeting adjourned at 12.30, and the sections withdrew to their respective rooms to organize.

AFTERNOON SESSION. (May 27th.)

The Society re-assembled at 2.30 for general business, the President in the chair; the reception of reports from delegates was proceeded with. Reports were read from:—

Numismatic and Antiquarian Society of Montreal, by Mr. E. Lafontaine.

Natural History Society of Montreal, by Dr. Adams.

Women's Wentworth Historical Society, by Miss Nisbet.

Hamilton Ladies' College Alumnæ Association (verbal), Miss Nisbet.

Niagara Historical Society, Miss Carnochan.

Historical and Scientific Society of Manitoba, by Mrs. Bryce.

Wentworth Historical Society (verbal), Mrs. J. R. Holden.

Canadian Forestry Association, by Mr. E. Stewart.

A letter was read from Mr. E. Coyne, on behalf of the Ontario Historical Society, inviting the members of the Royal Society to attend the annual meeting of the Society to be held at Peterborough and Lindsay, on June 4th and 5th next.

Announcements were made of excursions arranged by the Local Committee (1) to Scarborough Heights on the afternoon of the 28th, when Professor Chapman would explain the interesting geological features of the locality; (2) to Niagara Falls on Saturday next, and (3) to the Muskoka Lakes.

The meeting adjourned at 3.30, and the sections met again in their various rooms.

EVENING SESSION. (May 27th.)

In the evening the President, Dr. Loudon, delivered the presidential address, which appears at the end of Minutes and Proceedings as Appendix A, after which the members attended Mrs. Loudon's reception.

SESSION II. (May 28th.)

The Royal Society re-assembled at 10 a.m. in general session, the President in the Chair.

Reports from affiliated societies were read from: The Ottawa Field Naturalists' Club, by Mr. F. T. Shutt; The Canadian Institute, by Professor Coleman; The Miramichi Natural History Association, by Dr. Fowler; Toronto Astronomical Society, by Mr. A. Harvey; The Entomological Society of Ontario, by Rev. Dr. Bethune; The U. E. Loyalists' Association of Ontario, by Rev. C. E. Thomson; The Literary and Historical Society of Quebec, by Mr. P. B. Casgrain.

Professor Lash Miller reported the following recommendation from the Third Section: That Mr. H. T. Barnes and Dr. J. C. Glashan, be elected Fellows of the Royal Society of Canada, which being put to the meeting, on motion of Prof. Lash-Miller, seconded by Mr. F. T. Shutt, was carried unanimously.

He also reported the following resolution from Section III. which was adopted: —

Resolved, That this section requests the Society to appoint a Committee for the purpose of ascertaining what action, if any, the Government of Canada is willing to take in the direction of extending the triangulation system of the United States Coast and Geodetic Survey into this country as urged by the Royal Society in a memorial presented to the Governor-General-in-Council in the year 1899, and to again urge the importance of the work.

The Section suggests the following Committee for this purpose:

The President of the Society, Sir Sandford Fleming, Mr. T. C. Keefer, Captain Deville, Dr. H. T. Bovey, and Prof. C. H. McLeod (convener).

The following resolution was unanimously adopted. On motion of Dr. J. W. Longley, seconded by Dr. Henry T. Bovey, *Resolved*, That the Royal Society of Canada reaffirms its approval of the proposition of Captain Bernier to fit out an expedition to explore northern waters and discover the North Pole, and would recommend the project to the favourable consideration of the Government and the public.

On motion of Dr. Johnson, seconded by President Loudon, it was resolved: That this Society highly appreciates the work done by the Government for the benefit of navigation through the Tidal Survey Department. It would at the same time respectfully represent that a further and speedy extension of the work is of the highest practical importance to shipping.

Further, it would renew its representations in favour of the establishment, under the Minister of Marine, of a Hydrographic Survey Department for the sea coast, similar to those found necessary in other maritime countries.

EVENING SESSION. (May 28th.)

An evening session was held in the West Hall of the University, when selections were read from their own writings by the following members of the Society:

William Wilfred Campbell, Duncan Campbell Scott, George Murray, Rev. Frederick George Scott.

Mr. C. G. D. Roberts contributed a poem, " On the Upper Deck ", which, in his absence, was read by Prof. Horning.

At the conclusion of the readings, a reception for the Society was held by the Faculty of Toronto University.

SESSION III. (May 29th.)

The Society re-assembled at 10.30 for general business, the President in the chair.

The Nominating Committee brought in the following report:—

The Committee beg to recommend the following as the officers for the year 1902-3:

President—Sir James Grant.
Vice-President—Lt.-Col. G. T. Denison.
Hon. Secretary—Sir John Bourinot.
Hon. Treasurer—Dr. James Fletcher.

The report was adopted unanimously and the above officers were declared duly elected.

The President announced that, in accordance with a resolution transmitted from Section III., the Council begs to recommend that M. Berthelot, of Paris, France, be elected a corresponding member of this Society. The recommendation was carried unanimously.

The President called on the sections to make their usual reports, which are as follows:—

Rapport de la Section I.

La première section fait rapport de ses opérations comme suit:—

Le bureau a été constitué de la manière suivante:

Président, l'honorable Pascal Poirier.
Vice-Président, M. Adolphe Poisson.
Secrétaire, D^r N.-E. Dionne.

Sous-commission de contrôle des travaux qui sont soumis à la section: MM. A.-D. DeCelles, Ottawa; J.-Edmond Roy, Lévis; l'honorable Thomas Chapais, Québec.

La section est heureuse d'admettre au nombre de ses membres l'honorable Thomas Chapais, l'abbé Gustave Bourassa et MM. Raphaël Bellemare et Ernest Gagnon, dont l'élection a été ratifiée par l'assemblée générale.

La section recommande comme délégués au congrès des Américanistes, qui sera tenu à New-York en octobre prochain, MM. J.-Edmond Roy et Léon Gérin.

Les travaux suivants ont été lus et référés à la sous-commission de contrôle.

1.—*Louisbourg en 1902.* Par l'honorable Pascal Poirier.

Description de l'état présent de la vieille forteresse, ainsi que du port et des sites environnants; reconstruction de la ville détruite, selon les plans qui nous en restent; aperçu historique très succinct; description du nouveau Louisbourg. L'auteur termine en attirant l'attention des gouvernements d'Ottawa et de Halifax sur l'importance qu'il y a de sauver ce qui reste des ruines. Il suggère que le gouvernement fasse l'acquisition du vieux Louisbourg pour le convertir en un parc public. Le tout accompagné d'une dizaine de gravures.

2.—*Notes sur le duel au Canada.* Par M. J.-Edmond Roy.

3.—*Origine de la population de la province de Québec.* Par Sir James LeMoine, docteur en droit.

5.—*Notre mouvement intellectuel et social en 1901.* Par M. Léon Gérin.

C'est la suite et le développement de l'étude présentée l'année dernière et parue dans le dernier volume des Mémoires de la Société Royale. On y trouvera la liste des ouvrages mis au jour depuis un an par des Canadiens-Français, ainsi qu'une critique de certains de ces ouvrages. L'auteur agrandit son champ d'observation, et cherche à se rendre compte de l'activité et de la direction de notre mouvement intellectuel par l'examen de nos librairies et de nos bibliothèques publiques. Il note l'influence sur nous des ouvrages et des conférenciers français, et celle des journaux et des livres anglais. Il présente quelques considérations sur le progrès social de notre race.

6.—*Historique de la bibliothèque de la Législature de la province de Québec, de 1792 à 1892.* Par M. N.-E. Dionne, docteur en médecine et ès lettres, bibliothécaire de la Législature de la province de Québec.

La bibliothèque de 1792 à 1833. Les greffiers de la Chambre d'Assemblée remplissent les fonctions de bibliothécaire pendant quarante ans. Etienne Parent, le premier bibliothécaire, en 1833. Il est remplacé, en 1835, par Jasper Brewer, d'extraction allemande. Lors de l'union des provinces, en 1841, le Dr William Winder et Alpheus Todd, le premier, bibliothécaire de la Chambre d'Assemblée du Haut-Canada, le second, son assistant, sont nommés à Québec, tous deux conservant leur titre. Incendie de la bibliothèque à Montréal, en 1849. G.-B. Faribault envoyé en Europe pour acheter des livres. Nouvel incendie en 1854. Le Dr Winder est remplacé, en 1855, par Todd. Gérin-Lajoie nommé son assistant. Voyage de Todd en Europe, en 1855. Il achète pour 40,000 dollars de livres. Lors de la confédération, Todd et Gérin-Lajoie montent à Ottawa avec la bibliothèque. L.-P. Lemay nommé bibliothécaire à Québec, 1867-1892.

7.—*Le régiment de Carignan.* Par M. Benjamin Sulte.

Après avoir obligé les Iroquois à mettre bas les armes, mille soldats furent renvoyés en France (1669) et quatre cents restèrent dans la colonie. Quel a été le rôle de ces derniers parmi nous; quelle influence ont-ils exercée sur l'ensemble de la population ? Nous étions alors 6,000 âmes. Il paraitrait que deux cents militaires, tout au plus, se sont fixés dans le Bas-Canada, mais pauvres, inhabiles aux travaux du défrichement et de la culture de la terre, ils n'ont pas dû être d'un grand secours aux habitants. Les deux cents autres ont formé la classe des coureurs de bois.

8.—*Le Curé Boullard (1682-1733).* Par l'Abbé Auguste-H. Gosselin.

A Beauport: Affaire de dime, au Conseil Supérieur, d'abord, puis au Conseil d'Etat; règlement définitif. A la cure et au Séminaire de Québec. Vicaire capitulaire et administrateur du diocèse, à la mort de Mgr de Saint-Vallier; démêlés avec l'intendant Dupuy.

9.—*L'Institution des Intendants; leur rôle en France et au Canada.* Par M. A.-D. DeCelles.

La section charge le Dr N.-E. Dionne de faire pour la prochaine réunion un rapport bibliographique de toutes les études littéraires, historiques et autres qui ont été publiées en langue française dans la province de Québec depuis 1800 à 1902, et recommande la continuation d'un travail de ce genre tous les ans.

Présents aux réunions de la section: MM. Dionne, Poirier, Roy et DeCelles.

Le tout humblement soumis,

J.-Edmond Roy,
Secrétaire intérimaire.

N.-E. Dionne,
Président.

Report of Section II.

As Acting Secretary, I have the honour to report the following proceedings:—

Officers elected:

President, Duncan Campbell Scott.

Vice-President, Rev. Dr. Bryce.

Secretary, Dr. Geo. Stewart.

New Members.—This section has elected for membership Rev. Chancellor Burwash, of Victoria University, and Mr. W. D. Lighthall, of Montreal.

The section also appointed a committee of two, Rev. Dr. Campbell and Mr. W. W. Campbell, to confer with a committee of Section IV. in relation to an ethnological survey of the Dominion.

Papers communicated to and read at Section II. :—

(1) "Picturesque Fort Garry," by Rev. Dr. Bryce, M.A.

(2) "The Underground Railway," by Rev. W. H. Withrow, M.A., D.D.

(3) "The Old Basque Tombstones at Placentia," by the Rt. Rev. M. F. Howley, D.D., of St. John's, Newfoundland.

(4) "In Camp Hill Cemetery, Halifax, N.S.: A Memorial of Joseph Howe," by Arthur John Lockhart. Communicated by Rev. Dr. Withrow.

(5) "Family Memoirs of the McCollom Family, U.E. Loyalists." by W. A. McCollom, Tilsonburg. Communicated by Sir John Bourinot.

(6) Introduction to a study in a forthcoming volume, by the author, on "The Origin, Translation, Classification, and Etymology of Proper Names," by Chas. Baillairge, A.M.

(7) "Thorwaldsen's Love : A Poem," by W. H. Withrow, M.A., D.D.

(8) "The Story of Griselda" by Geo. Murray, B.A.

(9) "The Crown of Empire: Ode for the Coronation of the King," by Rev. F. G. Scott.

(10) "Modern Libraries and their Methods," by Mr. L. J. Burpee. Communicated by Sir John Bourinot.

(11) "Dominique De Gourgues: A Ballad," by D. C. Scott.

(12) "Crowning of Empire : A Coronation Ode," by Wilfrid Campbell.

W. Wilfred Campbell,
Acting Secretary.

Report of Section III.

The Third Section held five meetings, the following members being in attendance:—Prof. Baker, Dr. Bovey, Prof. Cox, Dr. Ellis, Sir S. Fleming, Dr. Girdwood, Dr. Goodwin, Dr. Harrington, Dr. Johnson, President Loudon, Mr. McGill, Prof. McLeod, Prof. Metzler, Dr. Lash Miller, Dr. Ruttan, Prof. Rutherford, Mr. Shutt, Mr. Stupart, and Dr. Walker. The President of the section, Dr. Ruttan, occupied the chair.

In addition to the President's address, on "Dalton and the Theory of Atoms," thirty-four papers were read before the section, and the members and a number of visitors took part in an animated debate on "The existence of Particles smaller than Atoms." Well-attended excursions to the new power plant at Niagara Falls, and to the interglacial deposits east of Scarborough, diversified the proceedings.

The following resolutions were carried and referred to the Society for action:—

That this Society highly appreciates the work done by the Government for the benefit of navigation through the Tidal Survey Department. It would at the same time respectfully represent that a further and speedy extension of the work is of the highest practical importance to shipping. Further, it would renew its representations in favour of the establishment under the Minister of Marine of a Hydrographic Survey Department similar to those found necessary by other maritime countries.

That this section requests the Society to appoint a committee for the purpose of ascertaining what action, if any, the Government of Canada is willing to take in the direction of extending the triangulation systems of the United States Coast and Geodetic Survey into this country, as urged by the Royal Society in a memorial presented to the Governor-General-in-Council in the year 1899; and to again urge the importance of the work. The section suggests the following committee for the purpose: The President of the Society, Sir Sandford Fleming, Mr. T. C. Keefer, Captain Deville, Dr. H. T. Bovey, and Prof. C. H. McLeod (Convener).

That this section requests the Council to recommend the election of Professor M. Berthelot, of Paris, as corresponding member of the Royal Society of Canada.

Professor H. T. Barnes, of Montreal, and Dr. J. C. Glashan, of Ottawa, were unanimously elected members of the section ; and Prof. Baker and Dr. Ruttan were appointed a Committee on Publication.

The officers elected for the ensuing year are:—
President—Dr. Goodwin.
Vice-President—Dr. Ellis.
Secretary—Capt. Deville.

Papers read before the section: —

(*a*) *Mathematics.*

"On the Correlation of the Curve of the Second Order and the Sheaf of Rays of the Second Order in Geometry of Position," by Professor A. Baker.

"On the Matrix Analysis of Quantics and their Concomitants," by Dr. J. C. Glashan.

"Forms for the Abelian Integrals of the Three Kinds," by Dr. J. C. Fields.

"A Theorem regarding Determinants with Polynomial Elements," by Professor W. H. Metzler.

(*b*) *Physics.*

"On the Use of the Wheatstone Stereoscope in Photographic Surveying," by Capt. E. Deville.

"The Neutral Axis of Beams under Transverse Loads," by Professor H. T. Bovey.

"Soli-Lunar Time," by Mr. G. W. McCready.

"The Potential Difference required to Produce Discharge in Air and other Gases," by Mr. W. R. Carr.

"Penetrating Rays from Radium," by Professor E. Rutherford.

"Radio-active Emanations from Thorium and Radium," by Professor E. Rutherford.

"Excited Radio-activity from the Atmosphere," by Mr. S. J. Allan.

"Radio-activity Induced in Salts by Cathode Rays, and by the Discharge Rays from an Electric Spark," by Mr. W. R. Carr.

"Radio-activity Induced in Substances exposed to the Action of Atmospheric Air," by Mr. R. M. Stewart.

"On the Absolute Value of the Mechanical Equivalent of Heat," by Professor H. T. Barnes.

"On the Density of Ice," by Professor H. T. Barnes and Mr. H. L. Cooke.

"The Variation in the Density of Ice," by Mr. H. L. Cooke.

"The Fall of Potential Method as applied to the Measurement of the Resistance of an Electrolyte in Motion," by Professor H. T. Barnes and Mr. J. G. W. Johnson.

(*c*) *Chemistry.*

"A Modification of Victor Meyer's Vapour Density Apparatus," by Professor B. J. Harrington.

"On the Determination of Moisture in Honey," by Mr. F. T. Shutt.

"An Improved Method of producing Concentrated Manure from Human Refuse," by Mr. T. Macfarlane.

"Experimental Investigation of the Conditions Determining the Oxidation of Ferrous Chloride," by Mr. A. McGill.

"Analysis of Anthraxolite from Hudson's Bay," by Professor W. H. Ellis.

"Abnormal Results in the Hydrolysis of Amygdaline," by Professor J. W. Walker and Mr. W. S. Hutchison.

"Oudemann's Law, and the Influence of Dilution on the Molecular Rotation of Mandelic Acid and its Salts," by Professor J. W. Walker.

"Specific Heats of Organic Liquids, and their Heats of Solution in Organic Solvents," by Professor J. W. Walker and Dr. J. Henderson.

"The Specific Heat of Water of Crystallization," by Mr. N. N. Evans.

"Researches in Physical Chemistry carried out in the University of Toronto during the past Year," by Professor W. Lash Miller. Under this head the following eight papers were introduced:—

"Application of Polarimetry to the Determination of Tartaric Acid in Commercial Products," by Professor E. B. Kenrick and Dr. F. B. Kenrick.

"The Sulphates of Bismuth," by Dr. F. B. Allan.

"The Influence of Iron Salts on the Rate of Reaction between Chromic Acid and Iodides," by Miss C. C. Benson.

"The Reaction between Stannous Chloride and Water," by Mr. C. M. Carson.

"The Rate of Oxidation of Iron Salts by Oxygen," by Mr. J. W. McBain.

"The Rate of Reaction in Solutions containing Potassium Chlorate, Potassium Iodide, and Hydrochloric Acid," by Mr. W. C. Bray.

"The Rate of the Reaction between Arsenious Acid and Iodine in Acid Solution; the Rate of the Reverse Reaction; and the Equilibrium between them," by Mr. J. R. Roebuck.

"The 'Compensation Method' of Measuring the Rate of Oxidation of Iodides," by Mr. J. M. Bell.

W. Lash Miller,
Secretary pro tem.

Report of Section IV.

Four meetings were held. The minimum attendance was fifteen Fellows, and nine papers were presented, abstracts of most of which, more or less full, were read by the authors. In addition to these, the following were presented: "A Bibliography of Canadian Entomology," by Dr. C. J. S. Bethune; "Report of Phenological Observations in Canada," by Dr. A. H. MacKay; "Bibliography of Canadian Zoology for 1900 and 1901 (exclusive of Ethnology)," by Dr. J. F. Whiteaves.

A committee, consisting of Dr. A. H. MacKay, Sir James Grant, Prof. Macallum, Prof. Wright, Dr. William Saunders and Dr. Penhallow, was appointed to consider increased facilities for biological work in Canada. This committee reported urging that the Government be asked to increase the appropriation for this purpose, and take such other measures for increasing the effectiveness of this important work as they may deem best.

Dr. Bell sent in a provisional report from the Committee on Geological Nomenclature, which is as follows:—

REPORT OF THE COMMITTEE ON THE NOMENCLATURE OF GEOLOGICAL FORMATIONS IN CANADA.

OTTAWA, 22nd May, 1902.

THE SECRETARY, SECTION IV.,
Royal Society of Canada, Toronto.

SIR:

At the last meeting of the Royal Society, I was requested by Section IV. to select a committee of geologists, of which I was to act as convener, to take into consideration the nomenclature of geological formations in Canada.

In the beginning of May a committee for this purpose was named, and a meeting called for the 10th of the month. The following geologists were invited, and all accepted:—Dr. J. F. Whiteaves, Dr. R. W. Ells, Mr. Hugh Fletcher, Mr. R. G. McConnell, Dr. Robert Chalmers, all of the Geological Survey; Professor W. C. Miller, Provincial Geologist, Toronto; Professor F. D. Adams, McGill University, Montreal; Mr. B. E. Walker, Toronto; Dr. George F. Matthew, St. John, N.B.; Professor H. S. Poole, Dalhousie University, Halifax.

The meeting called for the 10th of May was held in my office in Ottawa, and was attended by all the members except the three last mentioned—Mr. Walker was about to sail for Europe, and Dr. Matthew and Professor Poole were unable to come so far.

After considerable discussion, it was the general opinion of the Committee that there is need for a uniform and better understanding as to the significance, not only of the proper names in use (for the divisions of the geological scale), but as to the relative comprehensiveness and classification of geological divisions themselves.

The unnecessary multiplication of so-called formational names was deprecated, and it was felt that it would be advantageous if some method could be adopted by geologists, which would allow of a general consideration or discussion of proposed new names for divisions of rocks before they were recommended for adoption.

Dr. Whiteaves, Mr. Fletcher, Mr. McConnell and Dr. Adams were appointed a sub-committee to consider the names of the various divisions of the whole sedimentary series in Canada, from Archæan up to the Pleistocene.

It was considered desirable that the present Committee should be authorized by Section IV. to enter into correspondence with the Geological Survey of the United States or any other body of geologists on the continent, with a view to securing, as far as possible, greater harmony and uniformity in the nomenclature of geological divisions, sub-divisions, and masses of rocks of all ages throughout North America.

The Committee then adjourned, with the intention of meeting, if possible, during the session of the Royal Society in Toronto.

Respectfully submitted,

ROBERT BELL, *Convener.*

A committee of three, consisting of Sir James Grant, Dr. Burgess and Prof. Penhallow, was appointed to act with Section II. to further the prosecution of ethnological work in Canada.

The Section recommended that the rules be suspended, and that Professor Prince be elected a Fellow.

One afternoon (Wednesday) was spent in a geological investigation of Scarborough Heights in Toronto.

The following officers were elected:—

President, Dr. Wesley Mills.
Vice-President, Dr. G. U. Hay.
Secretary, Prof. A. P. Coleman.

GEO. U. HAY, *Secretary.*

GENERAL BUSINESS.

The joint committee of Sections II. and IV. on an Ethnological Survey of Canada reported that they had conferred together and they submitted the following resolution which was carried unanimously:

Proposed by Rev. Dr. Withrow, seconded by Rev. F. G. Scott, That it is hereby recommended that the following members of Sections II. and IV. be appointed a standing committee of this Society, to co-operate with the British Association Committee, in an ethnological survey of Canada; and that the said Committee be empowered to take such steps as may be necessary to secure from the Dominion Government, and from the several Provincial Governments, the adoption of legislation relative to the establishment of national and provincial museums of ethnology, and the organization of a permanent ethnological survey of the entire Dominion: Prof. Penhallow, Hon. J. W. Longley, Sir James Grant, Dr. T. W. Burgess, Prof. John Campbell, Prof. George Bryce, Mr. W. W. Campbell; Professor D. P. Penhallow to be chairman (as chairman of the Committee of the British Association).

Moved by Dr. A. P. Coleman, seconded by Dr. L. M. Bailey, and carried:—

That the report of the Committee on the nomenclature of the geological formations in Canada be accepted, and that the committee be instructed to continue the consideration of the subject, and shall have power to add to their numbers geologists familiar with special departments of geology.

Also, that the Committee be instructed to arrange, if possible, for exchange of views with American geologists regarding an agreement as to the nomenclature of the geology of America.

On motion of Dr. Fletcher, seconded by Prof. R. Ramsay Wright, Rule 6 was suspended, and the election of Prof. E. E. Prince, as recommended by Section IV., was ratified.

On motion of Rev. Dr. Withrow, seconded by Mr. D. C. Scott, Rule 6 was suspended, and the election of Rev. Chancellor Burwash, of Victoria University, as recommended by Section II., was ratified.

On motion of Mr. Duncan C. Scott, seconded by Mr. Wilfred Campbell, Rule 6, was suspended, and the election of Mr. W. D. Lighthall, of Montreal, as recommended by Section II., was ratified.

It was moved by Dr. Matthew, seconded by Dr. Saunders, and carried, that:—

The Royal Society of Canada desires to record its appreciation of the great scientific and economic value of the work at present conducted at the Marine Biological Station of Canada, and in view of the great activity at present manifested, in Europe, with respect to international co-operation in the prosecution of studies relative to the fishing industry, it takes this opportunity to express to the Honourable the Minister of Marine and Fisheries the hope that the work which is designed to contribute so largely to the welfare of one of the most important industries may receive from the Dominion Government and from the Department of Marine and Fisheries the most liberal assistance.

Moved by Prof. Penhallow, seconded by Prof. Macallum, That a copy of this resolution be sent to each member of Parliament and to the Government.

It was moved by Dr. Johnson, seconded by Prof. Bovey, That the following be appointed a committee, with power to add to their numbers, to lay before the Government the views of the Society at such time as these deem most fitting: President of the Society, Sir Sandford Fleming, President Loudon, Dr. Bovey, Prof. McLeod, Dr. Johnson (Chairman and Convener).

Moved by Rev. Dr. J. C. Bethune, seconded by Sir Sandford Fleming, and carried, That the Royal Society desires to express its deep regret that its greatly esteemed Honorary Secretary, Sir John Bourinot, is unable, through illness, to be present at this meeting, and to convey to him their profound sympathy with him in his sufferings, and the earnest hope that he may soon be restored to his wonted health and strength.

The President, in putting this motion, spoke in the highest terms of the obligations under which the Society lay to the Honorary Secretary. Dr. Fletcher also spoke feelingly of Sir John Bourinot as an officer of the Society and a true friend.

The Hon. Pascal Poirier then addressed the meeting as follows:—

MONSIEUR LE PRÉSIDENT, MESSIEURS :

La Société Royale m'a fait l'honneur, l'année dernière, de me désigner pour aller sur place examiner l'état des anciennes forteresses françaises et anglaises de l'Acadie et de lui en faire rapport.

Je me suis acquitté de ma mission au meilleur de mes capacités, et j'ai eu l'honneur, hier, de lire mon rapport devant la section française de notre Société.

Il ne reste plus, au Nouveau-Brunswick, ni à l'île du Prince-Edouard, aucun des postes militaires d'autrefois. Ajoutons qu'à l'exception du fort Latour, à Saint-Jean, et de celui de Beauséjour, près d'Amherst, il n'y eut jamais, dans l'une ni dans l'autre de ces provinces, de forts importants, dignes d'être restaurés.

Le fort Latour, théâtre de l'héroïsme de madame Latour, est tellement disparu qu'on en ignore aujourd'hui jusqu'à l'emplacement.

Celui de Beauséjour, où je me souviens d'avoir vu sept gros canons montés sur leurs affûts, n'est plus qu'un monceau informe, une ruine, où le temps fait son œuvre de destruction. Un ministre fédéral de la milice en vendit un jour les grosses pièces aux fondeurs de l'endroit pour équilibrer son budget—idée qu'il trouva géniale.

Cependant, on voit encore l'endroit où furent la caserne, la poudrière et les casemates. Il serait possible de restaurer le fort suffisamment pour en faire un objet d'intérêt et d'instruction.

A la Nouvelle-Ecosse, le fort de Port-Royal, aujourd'hui d'Annapolis-Royal, a commencé par subir à peu près le même sort que celui de Beauséjour. Un autre ministre de la Couronne (l'un de ces deux glorieux personnages était un *conservateur* et l'autre un *libéral,* ce qui fait que les honneurs politiques sont partagés) autorisa, un jour d'automne qu'il faisait froid, le gardien du fort de démolir le dernier blockhouse qui restait pour en faire du bois de chauffage !

Les citoyens justement alarmés et craignant que le gouvernement n'aliénat le site même de l'antique forteresse, le prirent à leur charge et dépens, et restaurèrent le blockhouse ainsi qu'une partie des fortifications.

Prenant exemple sur Annapolis, les municipalités de Windsor et de Lunenburg ont mis sous leur sauvegarde respective les fortins qui font l'orgueil de leur ville; et ceux-ci aujourd'hui sont dans un louable état de préservation et de restauration.

Reste Louisbourg, l'objet principal de la mission à moi confiée.

Louisbourg, la plus formidable, avec Québec, de toutes les anciennes forteresses de l'Amérique, est dans un état de lamentable abandon. Il n'y reste plus pierre sur pierre. Tout a été démoli, trié, vendu, volé et enlevé. En remuant encore une fois les vieilles ruines, on a trouvé, l'année dernière, environ deux mille vieilles briques bien conservées. Elles ont été vendues à des marchands. La pierre de construction des édifices publics, un beau calcaire blanc apporté de France, a suivi le chemin des briques, aussi de fabrication française.

Les canons et les vieilles reliques ont également disparu. Ca été l'œuvre particulière des Vandales. On est présentement à fouiller la rade pour en retirer les canons et les armes sombrés avec la flotte française: de beaux canons en fer et en cuivre. Ils disparaissent avec le reste. On les retrouve aujourd'hui partout sur le continent d'Amérique; même ici, à Toronto, il y en a deux, me dit-on. Il n'en reste plus à Louisbourg, sauf ceux-là, que l'on n'a pas encore réussi à repêcher.

La propriété foncière, le site de l'antique forteresse, disparait à son tour. La société des Guerres Coloniales des Etats-Unis a mis la main, en 1895, sur une partie du Bastion du Roi, la citadelle, pour y élever une colonne à Pepperrell, monument assez disgracieux d'ailleurs, avec un boulet au faîte. Des *squatters* leur ont vendu ce terrain, et le gouvernement de la Nouvelle-Ecosse s'est hâté de ratifier l'acte de vente, en le déclarant légal à toutes fins. D'autres Américains, les constructeurs d'un chemin de fer allant de Canso à Louisbourg, viennent, cette année même, de se rendre acquéreurs de tout le rivage, de tout le terrain faisant face à la rade; et le gouvernement de la Nouvelle-Ecosse est encore venu régulariser l'acte de vente. Par quelle autorité? De quel droit? Je n'en sais rien. Lui-même, probablement, non plus; car le site de Louisbourg, toute la langue de terre, les cent arpents environ qui formaient l'enceinte de la ville, le cimetière, la pointe Rochefort, les glacis s'étendant jusqu'à Cap Noir, appartiennent toujours au gouvernement impérial, qui ne s'en est jamais dessaisi.

Un arrêté du Conseil Impérial, daté le 18 août 1882, transporte au Gouverneur-général du Canada, toutes les terres "d'ordonnance", tous les terrains militaires de la Nouvelle-Ecosse, à l'exception, toutefois, du site de Louisbourg, dont il n'est pas fait mention dans l'arrêté du Conseil.

Le titre, le *fee*, du champ où fut Louisbourg réside encore, par conséquent, dans la Couronne. Le gouvernement d'Ottawa n'aurait qu'à en faire la demande, à Londres, pour l'obtenir sur le champ.

Il est de l'intérêt national que le site de Louisbourg ne passe pas tout entier en des mains étrangères. Ce champ devrait être converti en un terrain national, "d'utilité publique". Le gouvernement qui a trouvé, l'année dernière, soixante ou quatre-vingts mille dollars pour acheter les plaines d'Abraham, où il n'est pas du tout sûr que la bataille des plaines d'Abraham se soit livrée, devrait, ce me semble, être requis de se rendre acquéreur, de devenir, de quelque façon que ce soit, propriétaire de l'enceinte et des alentours de Louisbourg, afin de conserver pour la postérité les débris d'une forteresse dont la prise décida, en 1758, de l'empire du Canada, entre l'Angleterre et la France.

Afin de donner une portée pratique aux remarques que je viens de faire, ainsi qu'au rapport que j'ai soumis à la Société, j'ai l'honneur, monsieur le Président, de proposer:

That the Royal Society would respectfully memorialize the Dominion Government to take steps for the acquisition and preservation of historic sites, buildings and places of interest which have a national importance.

This resolution was seconded by Dr. Parkin, and carried unanimously.

Moved by Dr. Saunders, seconded by Mr. Duncan C. Scott, and carried, That the cordial thanks of the Royal Society of Canada be presented to the Government of the Province of Ontario, the University of Toronto, the Local Committee and other citizens of Toronto, for the ample provision made for the expenses of the members, for the complete and perfect arrangements, for generous hospitality, and for the many thoughtful kindnesses which shall render the meeting of 1902 memorable in the annals of the Society.

Moved by Dr. Johnson, seconded by Dr. MacKay, and carried, That the hearty thanks of this Society are due and are hereby tendered

to the Local Committee for the very excellent arrangements they have made for this meeting, and the excursion connected with it.

Moved by Sir James Grant, seconded by Dr. Johnson, and carried, That the Local Committee be requested to convey the thanks of the Society to the citizens of Toronto who have received the visiting members with such warm hospitality.

Moved by Sir Sandford Fleming, seconded by Dr. Johnson, and carried: That the hearty thanks of this Society are due and are hereby tendered to the University authorities for the use of their beautiful and commodious buildings for the meetings of the Society and of its sections, and for the great attention paid to the comfort of its members.

The President thanked the Fellows for the way in which the meeting had been carried on, and then called on the President-elect, Sir James Grant, to take the chair.

Sir James Grant, in taking the chair, spoke of the excellent work of the Society and of the individual members. He expressed his appreciation of the honour that had been paid him.

The acting Secretary having announced that there was no more business before the Society, the President declared the twenty-first meeting of the Royal Society of Canada was now adjourned.

A reception was held in the afternoon by His Honour the Lieutenant-Governor and Miss Mowat.

EVENING SESSION. (May 29th.)

In the evening a most entertaining and instructive lecture was delivered by Prof. Jeffrey on "The Forest Trees of Canada." This lecture was copiously illustrated by original lantern views, and was highly appreciated by the large audience that attended.

APPENDIX A

PRESIDENTIAL ADDRESS

PRESIDENTIAL ADDRESS

Address of the President of the Royal Society of Canada at the Toronto meeting, May 27, 1902.

THE UNIVERSITIES IN RELATION TO RESEARCH.

It is now many years since I came to the conclusion that the provision of adequate facilities for research is one of the prime necessities of university education in Canada; and it is with the object of accelerating the movement which has already begun in this direction that I have selected the relation of the universities to research as the topic of my remarks on this occasion.

It will, perhaps, be expedient for me at the outset to say that I propose to use the word research in its widest meaning, *i. e*, as indicating those efforts of the human mind which result in the extension of knowledge, whether such efforts are exerted in the field of literature, of science or of art. It is a common mistake to apply the term research to what we somewhat erroneously denominate as "science," meaning thereby the physical and natural sciences. This limitation is comparatively modern, and science so defined is after all only a part of human knowledge.

The limits of research in its widest sense are coterminous with the knowable, and research itself is of very ancient date. The fund of knowledge accumulated even before the Christian era was enormous. This great fund, however, remained stationary, or nearly so, throughout the Dark and Middle Ages. During this period of mental stagnation, authority was the watchword of the learned. All knowledge was supposed to have been already discovered, and the efforts of the schoolmen were devoted to the application of this body of truth to life and conduct. This mediæval point of view has been quaintly and aptly put by Chaucer:

> Out of olde feldies, as man saieth,
> Comith all this newe corne from yere to yearn;
> And out of olde bokis, in good faithe,
> Comith all this newe science that menne learn.

With the Renaissance began a new epoch, an epoch in the midst of which we are still living. It marked, as has been well said, "the liberation of the reason from a dungeon, the double discovery of the outer and inner world." The study of the humanities, which was an incident of the Renaissance, rendered available to modern men the wisdom of the ancients. But much of the old knowledge was found to be spurious when examined with the new light, and even the authority of Aristotle, the demi-god of the scholastics, was discredited. Nothing henceforth was to be accepted on trust, and the injunction to "prove all things" became the watchword of the learned.

Although the Renaissance marked the regeneration of philosophy, of criticism, and in general of the whole process of thought, it especially denoted the birth of the physical and natural sciences, and hence their rise and progress may be taken as best illustrating the working of the new spirit of research. Roger Bacon in the thirteenth century protested vainly against the despotism of Aristotle, and advocated a new and fruitful learning which should be based upon experience. In the two centuries which followed, those scholars described by Whewell as the "Practical Reformers," working in their primitive laboratories, established a sound basis for a future natural philosophy One of these, Leonardo da Vinci (1452-1519), both a practical and a theoretical philosopher, anticipated modern science in his remark: "The interpreter of the artifices of nature is experience, who is never deceived. We must begin from experiment and try to discover the reason." Telesio (1508-1588), called by Francis Bacon "primus hominum novorum," said: "The construction of the world and the magnitude and nature of the bodies in it are not to be investigated by reasoning, as was done by the ancients; but they are to be apprehended by the sense and collected from the things themselves." These were some, but not nearly all of the forerunners of Francis Bacon (1561-1626), who by his writings, and especially by his "Novum Organum," elaborated in detail a method of research, the principles of which had been laid down by his predecessors.

From the overturning of the authority of Aristotle and the laying down of a secure basis for the advancement of knowledge, it was but a step to the inauguration of organized research, the aspect of the question to which I wish to invite your attention somewhat more in detail.

The chief agencies of modern organized research are (1) the learned societies, and (2) the universities. The former receive and publish research papers; the latter superintend and direct the investigators and publish results. To these should properly be added the various journals which have been established and carried on by private effort. It is a significant fact that the establishment of modern learned societies coincides closely in time with the Renaissance movement. Telesio, mentioned above, established one of the earliest mathematico-physical societies—the Academy of Cosenza. Other Italian societies of similar scope were founded in Rome in 1603, in Florence in 1657, and the Royal Society of London dates from 1660 or earlier. Organized research in universities was of slower growth. In them the mediæval spirit was tenacious of life, and it was only in the nineteenth century, in Germany, at the close of the Napoleonic wars, that research, not only in natural philosophy, but in the whole field of knowledge, became the basis of the German educational system; and I might remark, without going into details, that the university systems of France and the other principal countries of Europe, with the exception of Great Britain, are in the main parallel with that of Germany, although not so consistently elaborated. To understand then what organized university research means in the fullest development which it has hitherto attained, let us turn our attention a little to Germany, of the educational system of which it forms an essential part.

We are so subject to the authority of words that it is difficult for us to realize that the organization called a university in Germany is almost entirely different in scope and object from the institution which we so designate in this country. Hitherto, at least in England and Canada, the function of the university has mainly been to impart a general and liberal education, continuing and completing the beginning already made in the secondary school. Speaking generally, I may say that under the German system the work of our secondary schools and universities combined is performed by the gymnasium, the nine or ten years' training of which leaves the young man of nineteen or twenty years of age with a much better liberal education than that possessed by the average graduate in arts of an English, Canadian or American university. How this is accomplished it is not my purpose here to explain. There is no doubt, however, as to the fact, which is substantiated both by the nature of the curriculum of the gymnasium and by the testimony of those familiar with both systems. In this connection I recall the observation made to me on one occasion by a professor here, himself a wrangler of high standing in Cambridge, who remarked that it was always a mystery to him how the German gymnasium attained such extraordinary results, results which, he added, it would be hopeless to expect in England, while on the other hand I have more than once heard German professors express surprise at the meagre equipment of university graduates from America.

It is upon this substantial preliminary training that the work of the German university proper is based. Up to this point the young man has been a "learner;" on entering the university he becomes a "student." This distinction, expressed by the German words "lernen" and "studieren," marks the difference between gymnasium and university—the acquisition of knowledge under the teacher in one, the independent research under the guidance of the professor in the other.

The typical German university possesses the four faculties of theology, law, medicine and philosophy. The scope of the first three is evident from their designation, and with them we are not at present immediately concerned. The faculty of philosophy embraces the subjects which we include as university studies, under the head of arts and science. It is the most important of the four, the professors in it sometimes outnumbering those of all other faculties combined. The ultimate object of both professors and students is the advancement of knowledge, and the independence with which research is conducted is well expressed by the two words "Lehrfreiheit" and "Lernfreiheit"— the freedom of the professor as to what he teaches and the freedom of the student to select his special line of research. Some idea of the extent of this work may be formed from the number of universities in Germany, 21 in all, and from the fact that the aggregate number of matriculated students exceeds 12,000, in addition to non-matriculated students, who are also numbered by thousands, while the philosophical faculty at Berlin and Leipzig in 1901-2 numbered respectively 207 and 120. To the 21 universities mentioned should be added the nine technische Hochschulen which have now the right to confer the doctor's degree in the applied sciences.

It is impossible to exaggerate the enthusiasm which prevails among both professors and students in their common object, and this enthusiasm is increased by legitimate emulation. The reputation of a university depends upon the progress made by its professors, the reputation of a professor upon the progress made in his department. Hence, a student may be attracted from one university to another — which is allowable under the system — may choose to follow the lectures of the professor, ordinary or extraordinary, or even those of the privat-docent in his own particular line of work. Under such a system and under such stimulating conditions it is evident that both professors and students must take their work seriously, with the result that the combined effort of a vast number of the best minds in the country is concentrated on the advancement of all the principal branches of knowledge. With regard to the research work done by the student and without which the degree of Ph.D. is not conferred, it may be objected that much of it is not important and sometimes even trivial. It may be said, however, that it must all stand the test of publication after being approved by the professor, so that its value may at once be estimated by the learned world, and the scholastic standing of professor and student rated accordingly.

The place and importance of research in the German system is further indicated by the fact that even teachers in the gymnasium devote themselves to such work, their papers being published in the annual reports of these institutions. With such respect is the ability for research regarded that the publication of a paper of this kind may lead directly to a professorship in the university, as was the case, for instance, in the appointment of Weierstrass, the celebrated mathematician.

Let us now turn our attention for a few moments to the British university system. An extended description is unnecessary, since we are all familiar with the working of British universities themselves, or with the Canadian or American development of the original British type. Hence, it may suffice if I contrast briefly the British and German systems in some of their essential features.

In the organization of the German university research has been shown to be a fundamental principle; in the British university it is as yet incidental or of sporadic manifestation. I do not, of course, ignore the very important contributions which have been made by British scholars to the advancement of learning, but it is worthy of note that the credit for their splendid achievements is rather due to the individuals themselves than to the universities with which many of them were connected. The British university is not primarily an institution for research. In its function of providing the higher grades of a liberal education the proper comparison is with the upper classes of the German gymnasium, not with the German university proper. True, we find in some of the British universities a specialization in certain subjects, *e. g.*, in honour classics and mathematics at Oxford and Cambridge leading to higher work than that attempted in the gymnasium; but however advanced the studies may be, there is rarely any attempt to guide the English undergraduate in the direction of research. Reading and examinations are the academic watchwords, and to the great mass of students and tutors the field of research is a terra incognita.

The attitude of the British nation has been hitherto largely that of indifference towards organized research, and this has been true not only of the general public, but also of those engaged in academic administration. There has existed a deep-seated conviction, born perhaps of reiterated assertion, that the British university system is superior to that of Germany or any other country, and as near perfection as may well be. We are not concerned just here with the discussion of the merits of the system, which are undoubtedly many and great, but we must admit that the attitude of self-satisfaction which has prevailed, combined with the ignoring of other ideals, is at least unphilosophic. In the midst of such an atmosphere it is not surprising that the development of a true Renaissance spirit has been somewhat tardy.

But the British nation is on the eve of an awakening, an awakening which has already taken place among certain leaders of thought. The fact is dawning upon the British mind that some vital connection really does exist between national progress and scientific discovery, and that the latter should be fostered in connection with the higher institutions of learning. Under the conviction that British commercial supremacy will be seriously threatened unless foreign, and especially German, scientific methods are adopted, universities of more modern type than Oxford and Cambridge, and also technical colleges, have been established. Such institutions no doubt fill a long-felt want, but they do not go to the root of the matter. On the academic side they are but a modification of the older type; on the technical side they contemplate, not the discovery of new truth, but the application of what is already known. The spirit of research is lacking, and without it no expenditure of money, no raising of examination standards for mere acquirement, will actually increase the capital account of national knowledge.

It is perhaps owing in part to the general awakening already mentioned that a rudimentary scheme of research has been recently introduced in the University of Cambridge, where students pursuing original investigations are placed on the same level as the ordinary undergraduate and may obtain the B.A. degree as a reward for work of this kind. Notwithstanding the lack of more substantial encouragement a number of students have entered these courses, being attracted by the reputation of certain professors who are themselves zealously engaged in the prosecution of research. The number of such students, however, is relatively small, nor can it be said that the movement has become general, although other universities are beginning to do something in this direction, but it may perhaps prove to be the germ of a more complete organization in the future.

The policy of the universities of the United States regarding this matter is in marked contrast with the indecision and conservatism which prevail in the mother country. The type of mind which has been developed in the century and a quarter of separate national existence is one of great vigour and originality; but these qualities have for the most part been turned aside by the circumstances of a new country from abstract investigations. Research after the almighty dollar by the nearest short-cut has been, and perhaps still is, regarded as the chief national characteristic of our American cousins, and in this pursuit they have displayed a genius for concrete research in mechanical invention and an ability for commercial and industrial enterprise which have been an object of wonder, and latterly of anxiety to other nations. During the first hundred years of national existence the university of the gymnasium type which was inherited from England continued to develop and expand in the United States. Suddenly, however, almost exactly twenty-five years ago, a remarkable modification was introduced. The year 1877 marks an epoch in the establishment of the Johns Hopkins University, with research courses leading to the degree of Ph.D. as an addition to the usual undergraduate work; in other words, a grafting of the German university system upon the original stock. It is proper to state that even before that date research work had been prosecuted incidentally in some of the older existing universities. On consideration of the circumstances it it not difficult to account for this new departure. The movement was undoubtedly due to the influence of American students who had gone to Germany for special studies. This migration to and fro had been going on for some time before the founding of Johns Hopkins and still continues, the number of such students gradually increasing from 77 in 1860 to an average of about 400 annually during the last decade. The new university experiment was a success from the first. The scheme was carried out on such a high plane that large numbers of able and zealous students were attracted from all parts of the continent by the facilities for higher study and by the scholarships and fellowships which formed part of the scheme. The appointment of graduates of Johns Hopkins to positions in other universities and their success as teachers and investigators have led to a widespread demand for professors who have proved their capacity for original work.

Since 1877 many other universities, including the best of those already in operation, as well as new foundations, have added a graduate department leading to the Ph.D. degree, although none of these, with the exception of Clark University, has made the prosecution of research the sole business of the university. Some idea of the rapid progress of this movement may be gathered from the fact that the numbers pursuing graduate studies in the universities of the United

States have increased from eight, in 1850, to 399 in 1875, and to about 6,000 in 1902. We must conclude from these figures, I think, either that the national mind discerns some ultimate advantage in the cultivation of abstract science, or that, for once, it has been mysteriously diverted from the pursuit of the "main chance." It is surely significant that a practical philanthropist like Mr. Carnegie has recently bestowed the magnificent endowment of $10,000,000 for the establishment of an institution to be devoted solely to the promotion of research.

As to the ultimate scientific value of what has already been accomplished in the way of research under the influence of this recent movement, there is room for a qualifying remark. It must be remembered that much of the graduate work referred to does not mean actual research, the course for the Ph.D. in many cases being no higher than the honour B.A. course with us. What is required to remedy this unsatisfactory condition is that the Ph.D. be given only on the German plan, and that the main test therefor, a research, be published. When this condition becomes absolute there will be material for the world's judgment as to the amount and quality of the contribution to the advancement of knowledge.

Organized research in Canadian universities, as a definite system, can scarcely be said to exist as yet, although within the last decade certain beginnings have been made which indicate a movement in that direction. Canada, like the United States, has derived its university ideals from Great Britain. Some of the original faculties of our universities were a transplantation, so to speak, of groups of scholars from Britain, who brought with them intact the traditions in which they themselves had been nurtured, so that we received by direct importation scarcely more than fifty years ago a system which in the United States had been developing in its own way since the founding of Harvard in 1636. I cannot better illustrate the attitude towards research of many of these academic pioneers than by quoting the remark made by an English professor — himself a classical scholar — on an occasion so comparatively recent as the establishment of the physical laboratory in the University of Toronto. "Why go to the expense," said he, "of purchasing this elaborate equipment until the physicists have made an end of making discoveries?"

In the interval the idea of research has made gratifying progress among the well-informed. Probably few scholars could now be found in Canada who would put their objections so naively as my classical friend. This progress has come in part from a natural process of evolution within ourselves, and in part also from external influences, notably that of Germany and the United States. Many of our graduates have pursued courses of study in Germany and have brought back with them the German ideal. Besides, such is the geographical position of Canada with regard to the United States, and such the community of social and intellectual life, that the universities of these two countries must inevitably develop along parallel lines; and hence, if for no other reason, we may look forward to the gradual extension here of the research movement which is already so widespread in the neighbouring republic.

That a natural and healthy demand for this kind of work already exists may, I think, be inferred from the success which has attached to the recent establishment of the doctorate degrees in certain universities, but still more perhaps from the fact that for some years it has been customary in some cases to direct honour students in the final year of the B.A. course to the work of research. In illustration of what has been accomplished in this way I may state that some of the papers presented in Section III. at the present meeting have been prepared by undergraduates in arts in the University of Toronto. But whatever may be the ultimate outcome of the research movement with us, permit me to repeat what I have already said in another connection, namely, that the Ph.D. should not be given without the presentation of a satisfactory thesis, and that such research should be published before the degree is awarded.

I have confined my remarks up to this point almost wholly to the historical aspect of the question, but it will perhaps not be out of place for me to point out in conclusion some of the advantages which, in my opinion, are connected with the pursuit of university research.

Let us consider first the stimulating effect upon the individuals and institutions concerned. Among those who are affected by this stimulus should first be named the professor. Dr. Samuel Johnson was wont to compare accumulated knowledge to a heap of ice lying exposed to the summer sun, the bulk of which could not be maintained without constant replenishment. Continuing the figure, we can readily imagine that the professor's fund of knowledge which is ample enough for the class-room teaching of immature minds might shrink and trickle away until little is left but the sawdust which we usually associate with the preservation of that commodity. Under the stimulus of research this is impossible, for research into the new implies a full and minute mastery of that branch of knowledge in which the research is being conducted. Hence, if no other advantage resulted, a good case might be made out along this line of argument.

This stimulus to the professor would react with increased force upon the student. It was a favourite saying of a certain celebrated artist, that those who follow after others rarely outstrip them. To hold up before the student, either by theory or practice, solely the ideal of acquiring what has already been learned is mediævalism pure and simple; it is to teach him to creep where he might walk upright and alone; it is to rob him in part of that intellectual birthright of independent thought which is the inheritance of every man, at least since the Renaissance. It is sometimes objected that the results attained by research students are often trivial or futile. I am disposed, however, to agree with a remark made by one of George Eliot's characters: "Failure after long perseverance is much grander (and I would say parenthetically more useful) than never to have a striving good enough to be called a failure." It is sometimes also urged that research in the immature student leads to superficiality and conceit. I cannot but think this fear ill-grounded. It has been proved on the contrary that nothing will so quickly ripen and enlarge preliminary knowledge and so effectually extinguish presumption as the hand-to-hand struggle with some special problem in the department of study in which the student is already proficient.

Apart from the professor and student, the first effect of the inauguration of research work in our universities, if of the genuine stamp, will be felt upon the teaching profession of the country as a whole. Assuming an educated and interested public opinion, the premium so long placed upon memorized knowledge will disappear, and a change in the principle of selection of teachers both in universities and secondary schools will result. The time will have gone by, let us hope, when a Huxley will be passed over, as was the case fifty years ago, when a chair in Natural History in the Provincial University was to be filled.

We come finally to the effect of research upon the national life. Canada, it is true, is barely on the threshold of national existence, rich, however, in natural resources, and richer still in the physical, moral and intellectual qualities of its people. Its future as a nation will depend largely upon the aggregate of intellectual effort of its population. In this sense truly knowledge is power. The time has surely come when we should cease to take all our knowledge at second-hand from abroad, and when we should do some original thinking suitable to our own circumstances. Under the term original thinking I do not include merely the researches of the laboratory, for the spirit of research which inspires the chemist or the philologist is one with that creative faculty which moves the poet and the novelist, a spirit which guides all contemporary movements in literature, science and art. For the development of this spirit of originality the country must look primarily to its universities, for on them depends ultimately the whole intellectual life of the people. The time is approaching, if indeed it has not already arrived, when the research university must be regarded as the only university, and the task is incumbent upon those in authority of elaborating a university system not necessarily in imitation of those of other lands, but one which shall have proper regard to the importance of this new factor as well as to the past and future of our country.

APPENDIX B

REPORTS OF ASSOCIATED SOCIETIES

REPORTS OF ASSOCIATED SOCIETIES

I.— From *The Natural History Society of Montreal,* through DR. F. D. ADAMS.

The Natural History Society of Montreal has the honour of submitting to the Royal Society of Canada the following report of its transactions for the year now ending:

The session just closed has been a very successful one. The meetings have been well attended, and the papers read took a wide range, and were of an interesting character.

Many additions were made to the museum, and as it is open free to the public every afternoon, the visits to it have been largely in excess of those of any former year. A large number of colleges and schools took advantage of the opportunity of examining its contents.

Several prominent members were removed by death during the year; but their number was more than replaced by the elections to membership.

The season's work was opened with a conversazione, which was honoured with the presence of the Honorary President, Lord Strathcona and Mount Royal. The President delivered his inaugural address at this meeting, pointing out the practical advantages of a study of natural history, and indicating the special local work lying to the hands of the Society to undertake. The meeting took place October 28th, 1901.

At the subsequent regular monthly meetings papers on the following subjects were read and discussed:

1901.
Nov. 25.—"Some Notes on Mount Royal," J. S. Buchan, K.C., B.C.L.
1902.
Jan. 27.—"Notes on some Ore Deposits of Southern British Columbia," Prof. Frank D. Adams, Ph.D., F.R.S.C.
Mar. 3.—"The Chateauguay Mounds," D. G. MacNaughton, B.A.
"The Niagara Gorge," O. E. Leroy, B.A.
April 2.—"The Starfish of Canada," Prof. E. W. MacBride, Sc.D., M.A.
"Some Earth Worms of Canada," Dr. J. Stafford.

April 24.—"Some of the Mushrooms of Canada," Miss Van Horne.
"An Unusual Display of the Aurora Polaris," Charles J. Stuart.

The Somerville course of lectures was given under the auspices of the Society as usual, and attracted good audiences. The following were the topics dealt with at the lectures:

1902.
Feb. 24.—"Marine Station Work in the Straits of Fuca," Prof. Conway MacMillan.
Mar. 6.—"How We get our Knowledge of the World about us," Prof. Wesley Mills, M.D., M.A.
Mar. 13.—"The History of the Progress of Botany in the Nineteenth Century," Rev. Robert Campbell, D.D., M.A.
Mar. 20.—"Alchemy,—A Chapter in the History of Science," Prof. Frederick Suddy, B.A. (Oxon).
Mar. 27.—"Some Lessons to be drawn from the Life History of Frogs and Newts," Prof. E. W. MacBride, ScD., M.A.

The Saturday afternoon talks to children were more popular than ever, many desiring to attend and on one or two occasions having to be turned away for lack of room. The course was as follows:

1902.
Feb. 15.—"History of a Loaf of Bread," J. S. Buchan, K.C., B.C.L.
" 22.—"What We Eat and What Becomes of It," Prof. Wesley Mills, M.D., M.A.
Mar. 1.—"About our Hearts," W. S. Morrow, M.D.
" 8.—"Hygiene," D. J. Evans, M.D.
" 15.—"Water Babies," E. T. Williams.
" 22.—"Mosquitoes," Thomas Craig, F.R.M.S.
" 29.—"Montreal Asters and Golden Rods," Rev. Robert Campbell, D.D., M.A.
April 5.—"The Butterflies and Moths of Mount Royal," E. A. Norris.

Two numbers of the "Record of Science" were issued during the year, the latter being a double number. The contents of these numbers fully upheld the high standard of quality which the "Record" has always aimed at maintaining.

The superintendant, Mr. Alfred Griffin, has continued to give the Society the benefit of his efficient services, although during part of the year his health has been feeble.

A vigorous campaign has been mapped out for the coming session, and, if the funds will permit, new departures will be made with a view to adding to the usefulness of the Society.

The following are the present office-bearers of the Society:

Patron—His Excellency the Governor-General of Canada.

Hon. President—Lord Strathcona and Mount Royal.

President—Prof. E. W. MacBride, M.A., D.Sc.

Vice-Presidents—Frank D. Adams, Ph.D., F.R.S.C., Rev. Robert Campbell, M.A., D.D., B. J. Harrington, Ph.D., F.R.S.C., A. Holden, J. H. Joseph, Dr. T. Wesley Mills, Hon. J. K. Ward, C. T. Williams, Hon. Justice Wurtele.

Hon. Recording Secretary—Chas. S. J. Phillips.

Hon. Corresponding Secretary—J. S. Buchan, K.C., B.C.L.

Hon. Treasurer—J. G. McKergow.

Hon. Curator—A. E. Norris.

Superintendent—Alfred Griffin.

Members of Council—F. W. Richards, Chairman; J. A. U. Beaudry, C.E., Prof. J. Bemrose, F.I.C., F.C.S., N. N. Evans, M.A.Sc., Joseph Fortier, John Harper, Edgar Judge, H. McLaren, H. Markland Molson.

II.—From *La Société de Numismatique et d'Archéologie de Montréal*, through Mr. Eug. Lafontaine.

En ma qualité de délégué de la Société de Numismatique et d'Archéologie de Montréal, j'ai l'honneur de présenter le rapport annuel de cette société.

A un certain point de vue, on peut, pour cette année, appliquer à la Société de Numismatique et d'Archéologie de Montréal le dicton qui veut que les peuples heureux soient ceux qui n'ont pas d'histoire. En effet, l'histoire se compose, pour une très forte partie, du récit des maux qui affligent l'humanité et de ses combats dans sa marche ascensionnelle vers le progrès, et ce serait ainsi un bonheur que de n'en pas avoir.

D'un autre côté, on a dit avec raison que la vie est dans le mouvement, et que tout ce qui est immobile est destiné à périr tôt ou tard. En sorte que les institutions qui n'ont pas d'histoire, comme les peuples qui en manquent, sont ceux qui vivent dans l'immobilisme, et par conséquent qui n'ont que peu de vie et sont condamnés à une mort prochaine. Aussi, c'est un plaisir pour les directeurs de la Société de Numismatique et d'Archéologie de constater une fois encore que, pendant l'année qui vient de s'écouler, leur société n'a pas été immobile, et que l'activité de ses membres s'est manifestée dans le cycle ordinaire de ses opérations, savoir séances mensuelles de la

société, préparation de travaux historiques et scientifiques, et surtout addition considérable de trésors nouveaux aux trésors déjà accumulés sous forme d'objets anciens et de portraits, tableaux, monnaies et médailles et de livres, pamphlets et revues.

Parmi les travaux présentés à la société et qui ont occupé quelques-unes de ses séances, il faut mentionner les suivants: —

Une causerie sur la monnaie romaine par M. R.-W. McLachlan.

Une étude historique sur le grand chef iroquois Hiawatha par M. W.-D. Lighthall.

Une biographie de l'historien Michel Bibaud par M. W. Sicotte.

Le musée, la galerie nationale de portraits et de peintures et la bibliothèque ont reçu des additions considérables.

Ainsi, 90 objets anciens et 30 médailles et monnaies ont été ajoutés au musée. De ces 90 objets anciens, 40 se rapportent au pays; parmi eux se trouve le secrétaire de Lord Dorchester, qu'il avait apporté avec lui au pays.

La galerie de portraits et de peintures s'est enrichie de 60 portraits d'hommes distingués du Canada, dont un portrait à l'huile, 4 gravures et 5 miniatures, et de 90 tableaux et plans, dont 30 sur des sujets canadiens.

Parmi les miniatures, il y a un portrait du duc de Richmond, et l'une des gravures représente la bataille des Plaines d'Abraham. Cette gravure a été donnée à la société par l'honorable Dato Meldrum, premier ministre de Jahore.

Dans la section de la bibliothèque, l'activité a été énorme, et 980 volumes et 730 brochures, dont plus de la moitié écrits par des écrivains canadiens, sont venus prendre place sur les rayons de la bibliothèque.

La Société de Numismatique et d'Archéologie de Montréal a la bonne fortune de réunir toutes les bonnes volontés, de puiser à toutes les sources de lumière et de richesses, d'accepter tous les concours généreux et dignes, d'où qu'ils viennent, sans distinction de nationalités, ni de croyances. D'elle, on peut dire qu'elle est une institution vraiment nationale; et, si l'on compare les résultats obtenus avec les faibles moyens à sa disposition, on ne peut s'empêcher de remarquer qu'elle doit les remarquables succès obtenus jusqu'ici,— faisant abstraction de l'habileté et du dévouement de son distingué président, M. le juge Baby, et des officiers de la société,— à cette union de tous les dévouements et de toutes les aspirations, pour arriver à la fondation d'un établissement *canadien* digne de Montréal et du Canada tout entier.

Les officiers de la société sont pour l'année courante: —

Président—M. le juge Baby.

Vice-présidents—MM. Henry-J. Tiffin, W.-D. Lighthall, H.-H. Lyman, Rouer Roy, L.-W. Sicotte et J.-B. Vallée.

Curateur du musée—W.-D. McLachlan.

Trésorier—G. Durnford.

Secrétaire-archiviste—C.-A. Harwood.

Secrétaire-correspondant—Emmanuel Ohlen.

Bibliothécaire—G. Désaulniers.

Conseillers—P.-O. Tremblay, Dr. L. Laberge, Ludger Gravel, Eug. Lafontaine, S.-M. Baylis, James Reid, C.-T. Hart, Lewis Skaife, et J.-A.-U. Beaudry.

III.—From *The Literary and Historical Society of Quebec*, through MR. P. B. CASGRAIN.

The report of the council at the annual meeting of the Literary and Historical Society of Quebec, held on January 8th, 1902, with a few additional remarks, will convey a sufficient summary of the work and position of our Society during the last year.

Though the past year has been one of comparative quiet in the annals of the Society, this does not imply any lack of capacity in discharging any of our recognized functions as a learned institution.

REPORT OF THE COUNCIL.

In at least one most important public movement the Society took the lead, viz. in the preservation of the Plains of Abraham as a public possession in perpetuity. The ideas of this movement originated with the Society several years ago, and our representative members took part in every phase of this vexed question from first to last. The gratitude of our members is especially due to two ex-presidents, Sir James LeMoine and Mr. P. B. Casgrain for the zeal and discretion with which they always furthered this project; and it is to them in particular that our thanks are due for the happy result attained last year. It would be ungenerous not to fully acknowledge that this result could only have been attained by the hearty co-operation of many prominent men outside of our own ranks; but it would be equally unfair to omit to mention that the honours of the initiative remain with our Society.

Our relations with kindred bodies, all the world over, have been maintained with marked benefit to ourselves. But we should not forget that the vast mass of exchanges received require something on our part to be given in return, and we must soon publish a new volume of transactions, like those former ones so much sought after by the initiated in every quarter of the globe, or else face the certain loss of similar publications now received from others. Such publications are generally assisted by grants in aid in every civilized community; but, as this help was withdrawn some few years ago, we have since been trying to raise a special endowment fund, which might enable us to worthily maintain that position which the hard and entirely unremunerated labours of our members won for us, through the many volumes of transactions published by means of Government grants. The public response has not been a very generous one except in the case of a few individuals. As a matter of fact, the entire endowment fund received from the public does not nearly equal the amount spent by the Society on the many courses of lectures freely given to the public.

It is satisfactory to be able to report that, in spite of the regrettable loss of a few members by death, resignation or removal from the city, we have again increased our membership during the past year. We have to deplore the deaths of two old members, Mr. W. W. Welch and Mr. Alex. Woods; there have been three resignations, and two associates have left the city. On the other hand, thirteen new members have joined, and these, together with those joining in the previous year, have raised our actual members by thirty since the annual meeting of 1900.

Our winter course of lectures was inaugurated by an admirable lecture from Prof. Sidley, on Tennyson: Poet and Teacher. This was followed by a lecture from an old favourite with our audiences, Prof. Gunn, who gave an interesting sketch of "Rambles and Student Life in Germany." Several other lectures will follow during the winter months.

The Society was worthily represented at the last annual meeting of the Royal Society of Canada by Mr. P. B. Casgrain.

The council recommends that an application be made to the Lieutenant-Governor-in-Council for leave to change the rules requiring the stated meetings of the council and Society to be held at fixed hours, in order that all council, general or annual meetings may, in future, be held at such hours as may be found most convenient for the time being.

We have to acknowledge the very generous special donation of Mr. Wm. Price, who gave $100 unconditionally to serve any purpose for which it might be used.

We have much pleasure in taking note of the new academic honour conferred on one of our oldest and most active leaders, Sir James LeMoine, who lately received the honorary degree of D.C.L. from Bishop's College, Lennoxville.

Our warmest thanks are due to the authorities of Morrin College for their continued generous dealings with the Society.

In conclusion, we must say, that whilst our financial position has at last been brought to a state of equilibrium, we have only succeeded in doing this by the most vigorous economy and by ceasing to publish transactions. At a time when the Government has shown an enlightened generosity towards a similar body; and when it has wisely spent considerable sums in furthering the invaluable collections of material made by Mr. Doughty, for his great work on the Days of Wolfe and Montcalm, we may hope that the new council will see to it that the distinctly just claims of an old, but actively capable Society like ours, will be so set forth that we will be enabled to continue our public work in a way befitting our own reputation and that of the community to which we belong.

The whole respectfully submitted.

William Wood,
President.

Officers.

President—Sir James M. LeMoine, D.C.L.
Vice-Presidents—J. T. Ross, P. Johnstone, C. Tessier, S. Lesage.
Treasurer—James Geggie.
Recording Secretary—A. Robertson.
Cor. Secretary—J. F. Dumontier.
Council Secretary—W. Clint.
Librarian—F. C. Wurtele.
Curator of Museum—F. Carrel.
Curator of Apparatus—Geo. Lampson.
Additional members of Council—Capt. Wm. Wood, P. B. Casgrain, A. Campbell, D. H. Geggie.

Mr. A. Campbell intimated that he would be pleased to give a cheque for $50 towards helping in the purchase of some of the works of modern writers not now in the library, and handed his cheque for that amount to the president.

Captain Wood, the retiring president, then vacated the chair, and in doing so thanked the Society for the hearty support that he had received from them all during his two years of office.

Sir James LeMoine having assumed the President's chair, Mr. P. B. Casgrain rose to convey the Society's hearty thanks to Capt. Wood for the able, energetic and successful manner in which he had filled the President's chair for the last two years.

Sir James LeMoine also said that the Society was very much indebted to Capt. Wood for his untiring efforts in their behalf during his term of office.

Ethnologists and linguists, as well as students generally, will doubtless be glad to learn that the Society contemplates adding to its historical documents, by the publication of a glossary of the Huron language, seemingly the work of Father Chaumonot, one of the first Jesuit missionaries in Canada, particularly to the Huron tribe.

L'Abbé Vincent, a descendant of the Lorette Indians of this tribe, has kindly put this precious manuscript, now in his possession, in care of the Society for publication.

The Society at a recent meeting unanimously passed a resolution to join with the citizens of Quebec, in erecting to the late Marquis of Dufferin and Ava, a permanent memorial,— as a token of gratitude to the memory of his Lordship, the honoured Patron of the Society,— and also the true friend and benefactor of the city of Quebec during his auspicious term of office.

Since the last report and during the winter months, several lectures were given under the auspices of the Society, and one may be specially mentioned as being very interesting and practical, due to Capt. O'Farrell, an able and efficient officer of the Marine Department, at Quebec, the subject being the Lighthouses of the River and Gulf of St. Lawrence. This lecture will be a valuable contribution to our *Transactions*, and a useful aid to mariners.

IV.— From *L'Institut Canadien de Québec,* through Mr. H. Chassé.

Le rapport que j'ai encore l'honneur de vous soumettre cette année vous démontrera, je le crois, que notre institut continue à marcher dans la voie du progrès.

Nos finances sont de plus en plus prospères.

Nous avons admis durant l'année dix-sept nouveaux membres, et nous avons doté notre bibliothèque de 644 nouveaux volumes choisis parmi les ouvrages les plus intéressants.

Nos conférences ont toujours été suivies par un public nombreux et distingué.

En voici la liste par ordre de date:

Le 21 octobre 1901, trois charmantes chroniqueuses "Gaétane de Montreuil" de *La Presse*, "Madeleine" de *La Patrie*, et "Colombine" du *Pionnier*, sont venues nous raconter leurs impressions d'un voyage fait au lac St-Jean, sous les auspices de la Société de Rapatriement et de Colonisation du Lac St-Jean.

Le 27 février 1902, conférence par M. Edmond de Nevers sur "Les Anglais et Nous".

Le 10 mars 1902, conférence sur "l'Orientation intellectuelle en France", par M. Léopold Mabilleau, professeur agrégé au collège de France, à Paris, et directeur du Musée Social.

Le 13 mars 1902, conférence par M. Edmond Lortie, avocat, sur "Lafontaine et ses Fables".

Le 18 mars 1902, "La Chanson de Roland", conférence par M. l'abbé J.-Camille Roy, licencié ès-lettres et docteur en philosophie, professeur de Belles-Lettres au Séminaire de Québec.

Le 2 avril 1902, conférence par M. Hughes LeRoux sur "Les Marins Normands". M. LeRoux, un écrivain éminent, était cette année le 5ème conférencier annuel du cercle français de l'Université Harvard, à New-York.

Les perspectives pour l'avenir sont bien encourageantes, et j'ai lieu d'espérer que, durant la prochaine saison littéraire, nous verrons à la tribune de l'Institut Canadien plusieurs autres conférenciers remarquables.

V.— From *The Ottawa Literary and Scientific Society*, through MR. W. H. HARRINGTON.

As the duly appointed delegate of the Ottawa Literary and Scientific Society to attend the present session of the Royal Society of Canada, I have the honour to submit the following report:—

During the year ending the 31st of March last, fifty new members were elected, and the total membership on that date was two hundred and ninety.

The report of the treasurer shows that the total receipts during the year were $1,246.25, and the total expenditure $1,212.76, leaving a balance on hand of $33.49.

The usual annual lecture course was opened by a largely attended conversazione in Goldsmith's Hall, on the 5th of November.

The President, Dr. Charles Morse, delivered an interesting inaugural address, after which a programme of reading and music was presented.

This was followed by a course of lectures, some of them giving scientific opinions from the point of view of the original investigators.

The following Syllabus gives the names of the lecturers and the subjects dealt with:—

1901.

Nov. 15— Conversazione.

Nov. 29.— Prof. E. E. Prince, B.A., F.L.S., "The Royal Game of Golf."

Dec. 13.— Lt.-Col. W. P. Anderson, C.E., "Modern Types of Danger Warnings on the Sea Coast."

1902.

Jan. 10.— J. M. Macoun, Esq., "Fauna of the Chilliwack Valley."
O. J. Jolliffe, Esq., M.A., "Alfred the Great."
Otto J. Klotz, Esq., "The Pendulum."

Feb. 7.— Professor E. Haanel, Ph.D., "Ions."

Feb. 28.— D. H. Keeley, Esq., "The Marconi System."

Mar. 7.— G. R. Maxwell, Esq., M.P., "The Teachings of Sartor Resartus."

Mar. 21.— Charles Morse, Esq., LL.B., D.C.L., "Impeccancy of the King."

Some of these papers will appear in vol. No. 3 of our Transactions, which is now in the hands of the printer.

The reading room continues to be well patronized. It is supplied with the leading newspapers, magazines and reviews — between 50 and 60 all told.

The number of volumes in the library, as shown by the catalogue, is 4,584. There have been added during the past year 302 volumes, being an increase of 62 volumes over the preceding year. This is due to the handsome donation of $200 from Mr. John Manuel.

We have on our exchange list some 200 societies and institutions, and during the past year, by means of our Transactions, we have exchanged 180 publications in the form of pamphlets, charts, magazines, monographs and volumes constituting a valuable addition to our library. The Spanish, French, German and Russian languages are represented in our exchanges.

The issue of books from the library during the past year was 5,902, and the issue of magazines 1,509, making the total issue 7,411.

At the annual meeting, held on the 25th of April, the following officers were elected:—

President—Charles Morse, D.C.L.
1st Vice-President—H. H. Bligh, K.C.
2nd Vice-President—James Ballantyne.
Secretary—S. J. Jenkins, B.A.
Treasurer—A. H. Whitcher.

Librarian—O. J. Klotz.

Curator—O. J. Jolliffe, M.A.

Councillors—W. D. LeSueur, LL.D.; R. W. Ells, LL.D.; W. H. Harrington, F.R.S.C.

During the past year the work of the Society has been attended by rather more than average success, and it is gratifying to know that it is doing something in the way of placing before its members the means of a broader and fuller culture.

VI.—From *The Ottawa Field Naturalists' Club,*
through Mr. W. T. Macoun.

On the 18th of March last, the Ottawa Field Naturalists' Club completed its twenty-third year since organization and the work accomplished during the twelve months just passed shows that the Club is as active as ever, with a bright outlook for the future.

A hopeful indication of more active interest in the work of the Club, is the attention which is being given to nature study by our educational institutions. Already this movement has brought a desire among the teachers for more knowledge of the wonders of nature and the increased interest they have, of late, taken in the work of the Club is very marked. Some of them are already imparting information regarding birds, plants, insects, etc., to their pupils, and it is hoped and expected that more young people will, in the future, take an interest in natural history.

Membership.

The Club membership is now about 250, in addition to which are seven corresponding members. It is the aim of the Club to increase the number of working members, and every effort is made to induce as many as possible to regularly attend the soirées, and excursions held during the year.

Winter Soirées.

The soirées held during last winter were very successful, both in regard to the quality of the material presented, and in the large audiences which gathered to hear the speakers. The course was more varied than in former years as, departing from the usual custom of depending principally on local members, several gentlemen were invited from other cities to deliver lectures before the Club.

Following is the programme as carried out:—

1901.

Dec. 10.—President's Address, "On the Extinction of Useful Animals in Modern Times."
  Short addresses by Dr. J. A. MacCabe, F.R.S.C.; Professor Macoun and others.
  Conversazione, with exhibition of Natural History objects and Microscope slides.

1902.

Jan. 14.—"On the Relation of Geology to Geography," illustrated by lantern slides, by Professor R. A. Daly.
  Report of the Geological Branch.

Jan. 28.—"The Natural History of Honey Bees," by Mr. Percy H. Selwyn.
  Report of the Entomological Branch.

Feb. 11.—"The Ferns of Canada," illustrated by lantern slides, by Rev. Robert Campbell, D.D., Montreal.
  Report of the Botanical Branch.

Feb. 25.—"The Present Position of the Evolution Theory," illustrated, by Professor E. W. MacBride, McGill University, Montreal.
  Report of the Zoological Branch.

Mar. 11.—"Native Birds: their Characteristics and Habits," illustrated by lantern slides, by W. E. Saunders, Esq., London.
  Report of the Ornithological Branch.

Mar. 18.—Annual Meeting. Reports of Council and election of officers.
  "Notes on the Arboretum at the Central Experimental Farm, Ottawa," by Mr. W. T. Macoun.

A special lecture was delivered on February 22nd, by Dr. Conway MacMillan, of Minnesota University, which proved of great interest, the subject being "Marine Biological Stations on the Straits of Fuca, B. C."

Excursions.

The excursions and sub-excursions held during the season of 1901, were not as numerous as in some previous years, but this was not owing to lack of arrangement for them, but to the fact that the weather was very unfavourable on most of the dates chosen. Much field work was, however, done by individual members of the Club.

Work done by the Several Branches of the Club.

The work of the various branches covers a wide field. Much additional material was obtained by the Geological Branch and notes were made on the stratigraphy and character of the rock formations near Ottawa, the strata being photographed at many places. A list of fossils from the Utica formation and a list of fossil sponges from geological formations near Ottawa, were furnished by this branch, also a list of Pleistocene shells from the sand-pit about two miles above Hog's Back on the Rideau River. The interest and work in botany was maintained, and several new species were added to the Ottawa flora during the year. Four of which were violets new to science. In Zoology there are few workers. Some interesting studies were, however, made and placed on record. Many interesting insects were captured during the year by members of the Entomological Branch, and the life histories of others were studied. The work of inflating the skins of larvæ was also continued by several of the members, and good collections of these are being made. The work covered by the Ornithological Branch was about the same as in previous years. The dates of the arrival of about 125 species were recorded. Several local observers sent in their records and the earliest dates were taken. In addition to this a comparative table of the first arrival of birds in several parts of Canada was made and published in the Naturalist.

The Ottawa Naturalist.

The Ottawa Naturalist, the official organ of the Club, was published regularly during the past year under the editorship of Mr. James M. Macoun. Twelve numbers were issued containing 286 pages, three maps, six botanical plates and five palæontological plates. Over fifty titles of papers appeared in this volume, which is the fifteenth that has been published.

Officers of the Club.

At the annual meeting held in March, 1902, the following officers were elected for 1902-03.

Patron—The Right Honourable Earl of Minto, Governor-General of Canada.

President—Robert Bell, M.D., F.R.S., LL.D.
Vice-Presidents—W. T. Macoun, A. E. Attwood, M.A.
Librarian—S. B. Sinclair, B.A., Ph.D.

Secretary—W. J. Wilson, Ph. B. (Geological Survey Dept.)

Treasurer—A. Gibson (Central Experimental Farm.)

Committee—Jas. Fletcher, W. H. Harrington, F. T. Shutt, Miss M. McK. Scott, Miss A. Matthews, Miss R. B. McQuesten.

Standing Committees of Council—Publishing—J. Fletcher, W. T. Macoun, F. T. Shutt, W. J. Wilson, A. E. Attwood.

Excursions—W. H. Harrington, W. J. Wilson, A. Gibson, S. B. Sinclair, Miss Scott, Miss McQuesten, Miss Matthews.

Soirées—S. B. Sinclair, F. T. Shutt, J. Fletcher, A. E. Attwood, Miss Scott, Miss McQuesten.

Leaders—Geology—R. W. Ells, L. M. Lambe, W. J. Wilson, T. J. Pollock, C. F. King.

Botany—J. M. Macoun, C. Guillet, D. A. Campbell, A. E. Attwood, S. B. Sinclair.

Entomology—J. Fletcher, W. H. Harrington, C. H. Young, A. Gibson.

Conchology—J. F. Whiteaves, F. R. Latchford, J. Fletcher, R. Bell.

Ornithology—W. T. Macoun, A. G. Kingston, Miss Harmer, C. Guillet.

Zoology—John Macoun, W. S. Odell, E. E. Prince, Andrew Halkett.

Archæology—T. W. E. Sowter, J. Ballantyne.

VII.—From *The Hamilton Scientific Association for the Promotion of Literature, Science and Art,* through Dr. Burgess.

Your council is pleased to report a most prosperous year. Fifty-one new members have joined the Association. A new section has been formed—the Astronomical, which is most active, has a large membership, and holds fortnightly meetings. The Camera section still keeps up its enthusiasm and is preparing for another annual exhibition. The Geological section still has the able support of Col. Grant, and has added many new fossils to our collection, besides sending a number to different museums.

During the year the museum has been kept open each Saturday afternoon for visitors.

In all there have been thirty-three meetings held at which papers have been read and discussed. Those read before the general Association have mostly been of high scientific interest, of which the following is a list:—

1901.

Nov. 14.—Opening Meeting—Inaugural Address, Pres., Dr. Morgan.
Dec. 5.—"Birds of New Zealand," Dr. D. V. Lucas.

1902.

Jan. 16.—"The Metric System of Weights and Measures," E. B. Biggar, Esq.

Feb. 13.—"Matter at Low Temperatures," Prof. Lang, Toronto University.

Mar. 13.—"The Manufacture of Iron," C. Fox, Esq.

April 17.—"Kingsley's Country of North Devon," A. H. Baker, Esq.

May 1.—"Life and Culture of Prehistoric Man," Prof. Macallum, Toronto University,

" 8.—"Natural History Notes," Wm. Yates, Esq.

Valuable papers were also read at the various section meetings.

The treasurer reports a balance on hand of one hundred and eighty dollars.

The present membership is 175.

VIII.—From *The Entomological Society of Ontario*, through the Rev. C. J. S. Bethune, D.C.L.

The Entomological Society of Ontario has now completed its thirty-eighth year and continues to perform good work of a practical and scientific character. Its membership maintains a steady growth and there is a frequent demand for complete sets of its publications from various parts of the world. Its monthly magazine and annual reports contain the records of so much original research and investigation that they have become essential to the equipment of every student in this department of natural science.

During the greater part of the year regular meetings have been held in the Society's room at London. On Tuesday evenings several young men have met for the systematic study of insects, under the guidance of Dr. Bethune and Mr. Moffat; on Thursdays the Geological section has continued, with unabated enthusiasm, to discuss the rocks and minerals of the surrounding country; on alternate Saturdays the Microscopical section has met throughout the winter to investigate the hidden things of nature and study the beautiful forms which cannot be seen with the unaided eye. Once a month, on Fridays, the Ornithological section has gathered together at the house of Mr. W. E. Saunders; the numerous papers by its members, published in the *Ottawa Naturalist*, testify to the energy and zeal with which they have devoted themselves to the study of bird life. During the summer the Botanical section took the place of the Microscopical, and held many interesting meetings. One field excursion only was made — to Komoka, a favourite collecting ground near London; it was thoroughly enjoyed by the few botanists and entomologists who attended.

The branches of the Society at Montreal and Quebec, the former of which has flourished for twenty-eight years, report that they have had a very satisfactory season. Regular meetings have been held and many excellent and interesting papers were presented; a few field days have also been found very enjoyable and have helped much in stimulating the ardour of those who attended them. The Toronto branch, like that at Quebec, is now five years old, but it has not received nearly so much encouragement and support as its twin-sister in the lower province. Why the "Queen City of the West" should furnish so few entomologists is difficult to understand; it has the advantage of many distinguished seats of learning, several extensive libraries, a number of scientific professors, and a rich and easily accessible country for exploration. Notwithstanding their limited number, the members of the branch have held frequent meetings, at which several excellent papers were read, and have made good progress in the formation of a collection of insects for the Ontario Department of Education.

A noteworthy feature of the Society's work is the delivery of popular lectures by competent members. Dr. James Fletcher has given a large number on insects, noxious weeds and nature study, in various places in Ontario, Manitoba, the Northwest Territories and British Columbia; Dr. Bethune has lectured, chiefly to school children and horticultural societies, in London and a number of towns not far distant, on noxious, interesting and beneficial insects; and Mr. W. E. Saunders has addressed teachers and other assemblies in Montreal, Ottawa and other places, as well as in London, on the Birds of Canada. These lectures have been well attended and listened to with great interest, and will evidently do much to awaken and stimulate a love for natural history and a desire to know more about the wonders in plant and animal life that everywhere surround us.

The thirty-eighth annual meeting of the Society was held in London in November last, and was attended by the Hon. J. Dryden, Minister of Agriculture for Ontario, and a number of members from different places. The proceedings opened with a discussion on the San José Scale, its ravages in Ontario and the best methods of keeping it under control; much useful information was given by Mr. G. E. Fisher, Provincial Inspector of Scale Insects; Dr. Fletcher, the Dominion Entomologist, and Professor Webster, State Entomologist of Ohio. An evening meeting, to which the public were invited, was held in the Normal School building; the Hon. J. Dryden took the chair and gave the opening address, in the course of which he said that the Entomological Society was one of the best as well as the oldest of the associations aided by the Government of Ontario, that "we need its accurate work and we have been greatly aided and helped by it during all the nearly forty years of its existence, and, no doubt, shall continue to be helped by it during the years to come." The Rev. Dr. Fyles, of Quebec, the President of the Society, gave an address on "The importance of Entomological Studies to the community at large," illustrating his remarks with a beautifully executed series of diagrams, the work of his own hand. He was followed by Dr. Fletcher, who spoke on "The value of Nature Study in Education," and concluded with an exhibition of lantern slides of plants, insects and other natural objects. During the remaining sessions a number of valuable practical and scientific papers were read; these are published, together with the reports of the Officers, Branches and Sections of the Society, in the 32nd Annual Report recently issued by the Ontario Department of Agriculture.

This volume of 128 pages is illustrated with two plates — a portrait of the late Miss Eleanor A. Ormerod, and a series of figures of the moth *Hyphantria cunea*,— three maps and fifty-eight wood cuts in the text. The principal articles are papers on the insects of the year 1901, by the directors, Messrs. Young, Evans and Johnston, and by Professor Lochhead and Mr. J. A. Moffat. "The Painted Lady Butterfly (*Pyrameis Cardui*)" and the "Entomological Record," a new and highly important feature, which is to be continued annually, by Dr. James Fletcher. "The North American Fall Web Worms," illustrated by the beautiful plate already referred to, by Mr. Henry H. Lyman. "The trend of Insect Diffusion in North America," the "Imported Willow and Poplar Curculio," and a singular case of a Cheese mite living in the culture intended for the destruction of the Chinch-bug, by Professor F. M. Webster. Two useful papers by Prof. Lochhead on the "Hibernation of Insects," and "Nature Study Lessons on the Mosquito." A paper by Mr. J. Alston Moffat, setting forth his reasons for believing that the Archippus butterfly, whose habits he has studied for many years, does not hibernate. Interesting papers on collecting and field work, by Mr. Evans, on the attractive powers of an electric lamp; Mr. Winn, on his wonderful captures at a clump of milk-weed at dusk; Mr. Walker, on "A collecting trip in south-western Ontario," and Mr. Gibson, on "A Day at the Mer Bleue." Dr. Fyles contributes a paper on "Crickets"; Mr. Stevenson, on "Commercial Entomology"; and Mr. Williams, on "The Food of the Grass Snake," which he finds to be cut-worms. The volume closes with a report from the Northwest (Canada) Entomological Society, by Mr. Gregson; and obituary notices of the late Miss Ormerod and Mr. Otto Lugger, by the editor.

"The Canadian Entomologist," the monthly magazine of the Society, is now in its 34th year of publication. The volume for 1901 contains 348 pages, and is illustrated with five full page plates and eleven figures from original drawings. The contributors number sixty-two, and represent Canada, the United States, England, Germany, Luxembourg and India. The principal articles may be classified as follows: Descriptions of new genera, species and varieties in Lepidoptera, by Messrs. H. H. Lyman, A. G. Weeks, A. Busck and Dr. Wm. Barnes; Orthoptera, by Dr. S. H. Scudder, Prof. A. P. Morse and Mr. A. N. Caudell; Hemiptera, by Mr. E. D. Ball and Prof. H. Osborn; Diptera, by Prof. T. D. A. Cockerell, Messrs. C. Robertson and D. W. Coquillett; Coleoptera, by Prof. H. F. Wickham and Mr. H. C. Fall; Hymenoptera, by Messrs. E. S. G. Titus, W. H. Ashmead, T. D. A. Cockerell and C. Robertson; Neuroptera, by Mr. N. Banks; and Homoptera (Hemiptera), by Messrs. G. B. King and T. D. A. Cockerell. Eleven new genera and sub-genera are described, and 123 new species and varieties.

Papers on classification and systematic entomology: Ontario Acrididæ, by Mr. E. M. Walker; lists of Lepidoptera from Alberta, by Mr. Wolley Dod; from southern Manitoba, by Mr. E. F. Heath; the Moths of Manitoba, by Mr. A. W. Hanham, and the Butterflies of Nebraska, by Mr. M. Cary; Cicadidæ, by Dr. A. D. McGillivray; the Genera and Species of Coccidæ, by Professor Cockerell; the Genus Catocala, by Professor G. H. French and Mr. O. C. Poling; Spilosoma congrua, by Mr. H. H. Lyman; Generic names in Orthoptera, by Mr. J. A. G. Rehn; discussions on Lepidoptera, by Dr. H. G. Dyar, Prof. J. B. Smith and Prof. A. R. Grote; Staphylinidæ, by Dr. E. Wasmann; Coccidæ, by Mr. G. B. King; Collecting Notes on Kansas Coleoptera, by Mr. W. Knaus; American Bees, by the Rev. T. B. Morice and Prof. Cockerell; The Genus Osmia, by Mr. E. S. G. Titus; the Respiration of Aleurodes, by Prof. C. W. Woodworth; the Xiphidiini of the Pacific Coast, by Prof. A. P. Morse; Note on Bæus, by Mr. W. H. Harrington.

Life histories of the following insects are given: Xylina Bethunei, by Mr. Lyman; several species of Hydræcia, by Mr. H. Bird; the Greenhouse Leaf-tyer, by Dr. Fletcher and Mr. A. Gibson; the Fall Cankerworm, by Mr. D. E. Hinds; several species of Catocala, by Messrs. G. M. and E. A. Dodge; Nannothemis bella, by Mr. R. Weith and Prof. J. G. Needham; and Arctia virguncula, by Mr. Arthur Gibson.

In Economic Entomology there are important papers by Mr. E. D. Saunderson on Plant-lice affecting peas, clover and lettuce; Diptera bred from cow manure, by Dr. L. O. Howard; the exportation and importation of Beneficial Insects, by Prof. F. M. Webster; the Insect Fauna of Human Excrement (a review), by Dr. J. Fletcher. Also a paper on the effects of Scorpion venom, by Mr. O. W. Barrett.

Officers for 1901-1902:—

President—Rev. T. W. Fyles, D.C.L., F.L.S., South Quebec.

Vice-President—Professor William Lochhead, Ontario Agricultural College, Guelph.

Secretary—William E. Saunders, London.

Treasurer—J. H. Bowman, London.

Directors—Division No. 1—C. H. Young, Ottawa.
Division No. 2—J. D. Evans, Trenton.
Division No. 3—E. M. Walker, Toronto.
Division No. 4—G. E. Fisher, Freeman.
Division No. 5—J. A. Balkwill, London.

Directors Ex-officio—(Ex-Presidents of the Society)—Professor Wm. Saunders, LL.D., F.R.S.C., F.L.S., Director of the Experimental Farms, Ottawa; Rev. C. J. S. Bethune, M.A., D.C.L., F.R.S.C., London; James Fletcher, LL.D., F.R.S.C., F.L.S., Entomologist and Botanist, Experimental Farms, Ottawa; W. H. Harrington, F.R.S.C., Ottawa; John Dearness, Normal School, London; Henry H. Lyman, M.A., F.R.G.S., F.E.S., Montreal.

Director Ex-officio—(Ontario Agricultural College)—Professor Wm. Lochhead, Guelph.

Librarian and Curator—J. Alston Moffat, London.

Auditors—J. A. Balkwill and W. H. Hamilton, London.

Editor of the Canadian Entomologist—Rev. Dr. Bethune, London.

Editing Committee—Dr. J. Fletcher, Ottawa; H. H. Lyman, Montreal; J. D. Evans, Trenton; W. H. Harrington, Ottawa; Professor Lochhead, Guelph.

Delegate to the Royal Society—Rev. Dr. Bethune, London.

Delegates to the Western Fair—J. A. Balkwill and W. E. Saunders, London.

Committee on Field Days—The Chairmen of the Sections and Dr. Woolverton, Messrs. Balkwill, Bowman, Law, Moffat, Rennie and Saunders, London.

Library and Rooms Committee—Messrs. Balkwill, Bethune, Dearness, Moffat and Saunders, London.

IX.—From *The Canadian Institute, Toronto,* through PROF. COLEMAN.

The council of the Canadian Institute has the honour to lay before its members its fifty-third annual report.

The council has much pleasure in recording an increased interest in the work and an extension in the influence and prestige of the Institute.

During the past session 22 regular meetings have been held, at which 25 papers have been read and presented, classified as follows:—Geology, 2; Forestry, 3; Topography, 1; Exploration 2; Physics 1; Ornithology, 1; Colour Photography, 1; Mining, 1; Mineralogy, 1; Astronomy, 2; Ethnology, 1; Morphology, 1; Biology, 1; Arbitration, 1; Literature, 1; Economics, 1; Botany, 1; History, 1; Miscellaneous, 2.

The general interest which many of the papers have excited has induced a large number of ladies and gentlemen who are non-members to be present at the meetings, and the council in noting this increase in the desire for scientific knowledge, ascribe no little portion of it to its labours in the past. The introduction of electricity and the general use of photography have permitted their use to an extent formerly unknown, and in doing so have added much to the interest of the subjects of the papers, especially is this the case with those papers which are devoted to the progress of exploration in the more remote portions of our province and the Dominion.

The report of the librarian shows that there is a steady improvement in the library. The special endowment has furnished the funds for supplying the lacunæ reported by Miss Cowan, and for purchasing some special sets which the Institute did not possess.

The growth of the library and the increased interest taken in the meetings, forces on the council the necessity of urging upon their successors the desirability of sparing no effort to dispose of the present building and to remove the Institute to a more central position. The centre of population has moved to the west and north, and the council notes an increased reluctance on the part of its members to come down town. They are confident that if the meetings of the Institute could be held in the neighbourhood of College Street, its growth and influence would be greatly increased.

The report of the Biological section appended shows a large amount of interesting work done; 14 papers have been read and several summer excursions held.

The council have to express their regret at the loss of the Hon. George A. Allan, by whose death the Institute loses one of its oldest members and heartiest supporters, and to whom it is indebted for donations of valuable books and the offer of a building site which unfortunately it found itself unable to accept.

The council congratulates the Royal Society on its proposed meeting in Toronto, the first which it has held in the west, and trusts that the welcome which it will receive will induce it to repeat its visits frequently.

During the past year two ordinary and six associate members have been added to the roll, and nineteen by death and resignation have been removed, so that the total number is now 204.

The report of the treasurer is appended, and the Council expresses its gratification at its satisfactory character. The very careful manner in which the treasurer has administered the funds of the Institute, has been confirmed by the auditors after an exact audit.

During the past year, No. 13, Vol. 7, of the Transactions was published. It contains a number of valuable papers, the illustrations of which were engraved at considerable cost in London and Boston. The greater portion of the next part is now in the hands of the printer, and will be ready at an early date.

The council have again to bear testimony to the attention and regularity of the assistant secretary, Miss Logan.

Report of Librarian.

The librarian begs to report for the year as follows:—

The number of exchanges received during the year is 2,273, and the number of donations is 250. The number of volumes added to the library by purchase is 33. 308 volumes have been bound and placed on the shelves. The number of books and periodicals taken out during the year is 1,531.

The space for the disposal of volumes, at the present rate of acquisition to the library, will be exhausted in about three years, and it is necessary for the Institute to consider at an early date what is to be done.

The following is the number by countries of the exchanges received during the year:—

Great Britain and Ireland	361
Canada	131
United States	528
France	239
Austria-Hungary	162
Italy	139

Germany	166
Holland	33
Belgium	23
Sweden	16
Norway	47
Denmark	12
Russia	54
Spain	26
Portugal	8
Switzerland	29
India	81
Australia	32
South America	35
Mexico	55
Japan	46
Java	14
Africa	22
Straits Settlement	2
China	7
New Zealand	3
Jamaica	2
	2,273

X.— From *The Natural History Society of New Brunswick*, through Dr. G. U. Hay.

I have the honour to present the report of the Natural History Society of New Brunswick, which I am pleased to say is in an excellent condition, with a large membership, and making use of its opportunities for work to the best advantage.

Every year the Society sees the importance of devoting its energies, almost exclusively, to studying and making known the natural history of New Brunswick. To this end the studies and field work of its members are directed; and nearly every paper and discussion before the Society during the past year and in other recent years keeps this fruitful and important subject constantly before the public. To show you that a faithful attempt is made to carry this out I may read to you our programme of papers and discussions for the past year.

1901.

Jan. 8. (*a*) "Botanical Trip among South Tobique Lakes. Additions to New Brunswick Plants," by Dr. G. U. Hay.
 (*b*) "Changes in the River Valleys of New Brunswick," by Prof. W. F. Ganong.

Jan. 15. (*c*) Annual Meeting. Reports. President's Address.

Feb. 5. (*a*) "Sketches of Bird Life," by A. Gordon Leavitt.
 (*b*) "Native Plants in Rockwood Park, St. John," by Dr. G. U. Hay.
 (*c*) "Catalogue of New Brunswick Plant Formations," by Prof. W. F. Ganong.

Mar. 5. (*a*) "Mountain, Lake and River Scenery in New Brunswick," by Prof. L. W. Bailey.
 (*b*) "A Plea for certain Birds Considered Destructive," by J. W. Banks.

April 2. (*a*) "Insect Life in the Nerepis Valley," by W. McIntosh. Prof. W. F. Ganong.
 (*b*) "Physiography of the Digdeguash Lake Basin," by

May 7. An Evening with the Microscope, by Members of the Section on Microscopy.

June 4. (*a*) "Note on the Possibility of Developing Power by the Movement of Tides at the Falls at the mouth of the St. John River," by Prof. A. W. Duff.
 (*b*) "Morphology of New Brunswick Water Falls," by Prof. W. F. Ganong.
 (*c*) Report of Delegate to Royal Society.

Oct. 1. (*a*) "Random Notes on Cape Breton," (*b*) "Additional Notes on the Cambrian of C. B., with descriptions of new species," by Dr. G. F. Matthew.

Nov. 5. (*a*) "Observations on a Summer's Work," by Prof. L. W. Bailey.
 (*b*) "Notes on the Physiography of the Tu-a-dook (Little Southwest Miramichi) Lake Basin," by Prof. W. F. Ganong.

Dec 3. (*a*) "Our Forests and their Inhabitants," by W. A. Hickman, M.A.
 (*b*) "Preliminary List of Coleoptera of New Brunswick," by William McIntosh.
 (*c*) "On the Physiography of the Tobique-Miramichi Watershed," by Prof. W. F. Ganong.
 (*d*) "Observations in Wild Garden at Ingleside," by Dr. G. U. Hay.

In addition to our regular programme of lectures there are elementary talks and discussions every week during the winter for the younger members. The ladies' association, in conection with the Society, has an interesting and well arranged course of lectures on a variety of topics during the same season. The library and museum are open three afternoons during the week to the general public, especially to the teachers and pupils of the schools. Frequently whole classes from the schools may be found in the rooms examining and studying the objects in the museum or listening to the elementary lectures.

During the past year an active committee of the Society has directed public attention to the importance of setting aside in northern New Brunswick a forest and natural park reserve, similar to those in Ontario and in the States of the Union, where the native flora and fauna may remain undisturbed and which may be for the enjoyment and instruction of the people. I am happy to state that the New Brunswick Legislature at its recent session passed an act to make such a reservation, and during the present summer a commission may visit the section proposed for the park, to examine it and determine its boundaries.

Our total membership is 211, made up of 4 honorary members, 5 life members, 22 corresponding members, 70 ordinary and 110 lady associate members. The latter take a great interest in the work of the Society, especially in the library and museum.

The provincial government has increased its grant to the Society from $200 to $300, thus providing for the enlargement of its publication, the annual bulletin, which, for the past year, is the largest the Society has ever published. It contains articles on the geology of New Brunswick and Cape Breton, by Dr. G. F. Matthew; notes on the natural history and physiography of New Brunswick, by Prof. W. F. Ganong; a descriptive account of the South Tobique Lakes, with the botany of the region, by Dr. G. U. Hay; the annual address of the president, Hon. J. V. Ellis; in addition to which there are reports of progress in the various departments of work in which the members of the Society are interested.

The following are the officers and members of the council for the year:—

President—Hon. John V. Ellis, LL.D.

Vice-Presidents—Geo. F. Matthew, LL.D., Henry George Addy, M.D.

Treasurer—A. Gordon Leavitt.

Secretary—G. U. Hay, D.Sc.

Librarian—Geoffrey Stead, C.E.

Curators—S. W. Kain, J. W. Banks, Wm. McIntosh.

Additional Members—J. Roy Campbell, James A. Estey, W. F. Hatheway.

XI.—From *The Nova Scotian Institute of Science,* through Mr. Henry S. Poole.

The Nova Scotian Institute of Science, through its delegate, begs to submit to the Royal Society of Canada a report on its proceedings during the past session.

Meetings were held from November, 1901, to June, 1902.

The following officers were elected for the year 1901-2:—

President—A. H. MacKay, Esq., LL.D., F.R.S.C., ex-officio F.R.M.S.

1st Vice-President—F. W. W. Doane, Esq., C.E.

2nd Vice-President—Henry S. Poole, Esq., F.G.S., F.R.S.C., &c.

Treasurer—W. C. Silver, Esq.

Corresponding Secretary—Prof. Eben Mackay, Ph.D.

Recording Secretary—Harry Piers, Esq.

Librarian—Maynard Bowman, Esq.

Other Members of Council—Alexander McKay, Esq., Edwin Gilpin, Jr., Esq., LL.D.; M. Murphy, Esq., Prest. Can. Soc. C.E., D.Sc.; H. H. Read, Esq., M.D.; W. L. Bishop, Esq.; R. McColl, Esq., C.E.; H. W. Johnston, Esq., C.E.

Auditors—Wm. McKerron, Esq., and G. W. T. Irving, Esq.

Parts 3 and 4 of volume X., new series, of the proceedings and transactions are in press and will be issued shortly.

In May, 1901, the Institute passed a resolution authorizing the formation of local organizations of its members in particular sections of the province, formed for the purpose of encouraging scientific study and investigation. Under the provisions of this resolution a branch was established at Wolfville, N. S., in May, 1901, under the presidency of Professor E. Haycock, and has held a successful session.

The following papers, etc., were communicated to the Institute during the session of 1901-02:—

1.—" A Talk on Roman Coins," by R. W. McLachlan, Esq.

2.—" Presidential Address," by A. H. MacKay, Esq., LL.D.

3.—" Exhibition of a Condensed form of Botrychium ternatum found at Blomidon, N.S.," by A. H. MacKay, Esq., LL.D.

4.—" The Progress of Geological Investigation in Nova Scotia," by R. W. Ells, Esq., LL.D.

5.—" Exhibition of a Collection of Flowers, made in Labrador, July and August, 1901," by Walter H. Prest, Esq., and named by Dr. A. H. MacKay.

6.—" The Cambrian Age of the Dictyonema Slates of New Canaan and Kentville, N.S.," by H. M. Ami, Esq., D. Sc.

7.—" Remarks upon supposed Worm-Trails in Argillite, from the sincline at Green Bank, Point Pleasant, Halifax," by H. S. Poole, Esq., F.R.S.C.

8.—" Notes on the Flora of Digby County," by Miss A. Louise Jaggar, of Redlands, California.

9.—" On the Determination of the Freezing-Point Depression Constant for Electrolytes," by Thomas C. Hebb, Esq., M.A., Dalhousie College.

10.—" Supplementary Notes on Drift Ice as an Eroding and Transporting Agent," by Walter H. Prest, Esq., M.E.

11.—" Agricultural Credit," by Professor John Davidson, Phil.D., University of New Brunswick.

12.—" On the Standardization of Hydrochloric Acid with Borax," by R. S. Boehner, Esq., B.Sc.

13.—" On the Determination of Freezing-Point Depressions of Dilute Solutions of Electrolytes," by T. C. Hebb, Esq., M.A.

The following papers, &c., were brought before the Wolfville branch of the Institute:—

1.—" Exhibition of a Collection of Shells from the Loo Chou Islands," by Rev. T. G. Harrington.

2.—" Outline of the Geological Structure of Kings County," by Prof. Ernest Haycock.

3.—" Exhibition of Nest of Mudwasp from Port Elgin, N.B., and an account of the habits of the Insect," by Prof. F. C. Sears.

4.—" Exhibition of about fifty species of Kings County Mollusca, with notes on their habits," by Prof. E. W. Sawyer.

5.—" Remarks on Concentrates from Home and Foreign Mines, and Exhibition of Material," by E. N. Payzant, Esq., M.D.

6.—" Parasites of the Cabbage Worm," by A. H. Ruggles, Esq.

7.—" Annual Retreat of the Coast of Minas Basin, at Long Island, Kings County," by Prof. Ernest Haycock.

XII.— From *The Nova Scotia Historical Society,* through the HON. J. W. LONGLEY.

During the season the following papers were read:—

1901.

Nov. 26.—" The Real Acadian," Professor McMechan.

1902.
Feb. —" Lord Charles Greville Montague," Mr. E. F. Hart.
Mar. —" Historical Notes of North Queens, Mr. R. R. McLeod.

The Society during the year has published " History of the War of 1812," by James Hannay, D.C.L., as a volume of transactions.

The annual meeting was held February 11, 1902, and the following officers elected:—

President—Hon. J. W. Longley.

Vice-Presidents—Hon. L. G. Power, Hon. Judge Townsend, and W. H. Hill, Esq.

Corresponding Secretary—F. Blake Crofton, Esq.

Recording Secretary—W. L. Payzant, Esq.

Treasurer—R. J. Wilson, Esq.

Council—Rev. Dr. Smith, Rev. Dr. Saunders, Prof. A. McMechan, and J. J. Stewart, Esq.

XIII.— From *The Natural History Society of British Columbia,* through Mr. Frank Sylvester, Acting Secretary.

I have the honour to submit the following brief report of the transactions of the above Society.

During the year 1901-02 twenty-one regular meetings were held, with a larger average attendance than the previous year.

There were nineteen papers, lectures and addresses delivered, a number of which, as will be seen from list accompanying this report, were on original subjects pertaining to British Columbia and the Pacific Coast.

Frequent contributions have been made during the year to the library of the Society, and to the Natural History collection.

With the interest which at present attaches to the work of the Society, and the increasing roll of membership, hopes are entertained of a larger amount of original investigation in this exceedingly fruitful field of natural history research. Among the new departures which have been made for the purpose of enlarging the scope of the Society's work, one of the most important has been the formation of an "Historical Section" for the better preservation of local records and memorials of the early settlement of the province.

The officers of the Society for 1901-02 are as follows:—

President—Canon Beanlands, M.A.

1st Vice-President—James R. Anderson, Dep. Minister of Agriculture.

2nd Vice-President—Oregon C. Hastings.

Secretary—R. E. Gosnell.
Treasurer—Carl Loewenberg.
Curator and Librarian—Frank Sylvester.
Corresponding Secretary—Dr. C. F. Newcombe.
Total number of members 109.

List of Papers Read.

"Native Ideas of Alaskan Races as to Future Condition," by Oregon C. Hastings.

The "Prehistoric Cairns of British Columbia," by Frank Sylvester.

The "Honey Bee," by E. F. Robinson.

The "Butterfly," by W. Croker Fox.

An address on the Educational System of Japan, by Prof. K. Yendo.

"Hybridization and Specific Variation," by Rev. Canon Beanlands.

An address by James Deans upon his recent trip to Europe.

An address on Nature Studies.

"Historical Review of the Life of the late J. W. McKay of the Hudson's Bay Co.," by James Deans.

An address by Professor Conway McMillan, of the Minnesota State University.

The "Mineral Resources of Vancouver Island and adjacent Coast," by W. H. Brewer.

"Earthquakes"—illustrated, by F. Napier Dennison.

"Six Months at Cape Nome," by O. C. Hastings.

"Philosophical Ideas of Ancient India," by Rev. Canon Newton.

"Mountain Climbing"—illustrated, by R. H. Jamieson and Howard Chapman.

"The Physical Basis of Logic," by F. W. Caulfield, B.A.

"Pelagic Sealing," by Capt. Clarke.

"Some Notes on British Columbia"—illustrated, by H. Carmichael.

XIV.—From *The Wentworth Historical Society,* through MRS. J. ROSE HOLDEN.

Our officers for the year now just closing are:—
President—F. W. Feaman.
1st Vice-President—Mrs. Edward Martin.
2nd Vice-President—Charles Lemon.

3rd Vice-President—Mrs. J. Rose Holden.

Sec-Treasurer—Justus A. Griffin.

Cor.-Secretary—Mrs. C. Fessenden.

Executive Council—Rev. Canon E. M. Bland, Major F. Snider, S. F. Lazier, K.C.; J. W. Jones, J. H. Laud, J. G. Y. Burkholder, R. T. Lancefield, Mrs. S. Carry, Mrs. S. Slater and Mrs. R. G. Sutherland.

Two public meetings have been held when papers have been read, as follows: —

Nov. 22, 1901.—A paper entitled "The Constitutional Development of Canada," was read by Prof. Adam Shortt, of Queen's University, Kingston.

March 4, 1902.—A paper by Mr. F. Kidner, entitled "Odds and Ends of Early Life in Hamilton," was read.

There have been a number of meetings of the Executive Council held to advance the interests of the Society and promote a knowledge of history.

This Society has devoted much attention to the Museum in Dundurn Castle, in which its own belongings are placed, and the institution of which has been to a large extent due to the efforts of this Society and its members. Mrs. Carry, one of our Executive Council, has loaned to the museum her collection of shells and other curiosities. The collection of shells numbers about 3,000, and is said to be the third best in the Dominion.

Much time has also been devoted to the search for information regarding the early history of this section of the country; some of the results will appear in the pamphlet to be issued by the Society this month, and articles now in preparation will at a later date be published. One of our Vice-Presidents, Mrs. J. Rose Holden, has been particularly active in this respect and will soon give the public the benefit of her researches. Our corresponding secretary has busily combatted the attempt to erect at Quebec, a monument in memory of Gen. Montgomery, and the Quebec Historical Society gives her credit for having contributed to the defeat of that project.

The Society has had to mourn the loss of its esteemed Hon. President, Geo. H. Mills, Esq., to whom was principally due its organization and who did much to make it a live and useful institution.

XV.—From *The Elgin Historical and Scientific Institute,* through MR. J. W. STEWART.

This Institute has to report another active and profitable year. There has been a good attendance at all the general meetings and meetings of the Council. A series of lectures, open to the public, were arranged for and carried out during the winter, resulting in much benefit, pleasure and some financial profit.

The series comprised:—

Lecture by Sir J. G. Bourinot, K.C.M.G., LL.D., D.C.L., Lit.D. (Laval), Honorary Secretary and ex-President of the Royal Society of Canada, on "The United Empire Loyalists in 1783 and 1901."

Lecture by Professor Maurice Hutton, M.A., Principal University College, Toronto, on "The Greek, the Roman, the Englishman and the Frenchman."

Lecture by Rev. George M. Wrong, M.A., Professor of History, University of Toronto, on "Oliver Cromwell."

Address by Mr. Jas. H. Coyne, B.A., President of the Ontario Historical Society, on "Impressions of Travel."

Lecture by S. Silcox, B.A., on "The Link between Plant and Animal."

Lecture by Mr. O. J. Stevenson, B.A., on "The development of the Novel."

Lecture by Mr. Frank Yeigh, in Duncombe Opera House, on "The Scenic Wonders of Europe."

Since the last report, the museum collection has been increased and valuable donations have been made to the library.

The projected Talbot Memorial has, we regret, made little progress during the year.

The ladies' branch has been especially active. Among the historical papers read at their meetings were the following:—

"History of the Church of the Holy Angels, St. Thomas."
"History of St. John's Church, St. Thomas."
"Early Schools and School Teaching."
"History of St. Thomas Schools."
"Habits and Customs of Early Settlers."
"Sketch on Early Furniture and Domestic Utensils."
"Early Political Events."
"Indian Picture Writing."
"Roads and Modes of Transportation."
"Early Surveys of Elgin."
"History of the Drake Family."
"Sketch of Laura Secord."
"Pioneer History of John Andrews."
"History of the Bannerman Family."

The officers of the Institute are as follows:—

President—J. W. Stewart.
Vice-President—S. Silcox, B.A.
Secretary-Treasurer—K. W. McKay.

Assistant Secretary—W. H. Murch.
Curator—Mrs. W. St. Thomas Smith.
Editor—Judge Ermatinger.
Council—Mrs. J. H. Wilson, Mrs. S. E. Burns, Mrs. E. W. Gustin, Mrs. F. M. Griffin, Mrs. S. Chant, W. Atkin, C. Oakes, J. H. Coyne.

The officers of the Ladies' Auxiliary are as follows:—

President—Mrs. J. H. Wilson.
1st Vice-President—Mrs. J. H. Coyne.
2nd Vice-President—Mrs. C. O. Ermatinger.
3rd Vice-President—Mrs. D. O'Shea.
Corresponding Secretary—Mrs. Gustin.
Recording Secretary—Mrs. S. Silcox.
Assistant Secretary—Miss Claris.
Treasurer—Mrs. E. Caughell.
Assistant Treasurer—Miss F. McLachlin.
Curator—Mrs. W. St. Thomas Smith.

XVI.— From *The Historical and Scientific Society of Manitoba,* through MRS. GEORGE BRYCE.

There has been no report of the Historical and Scientific Society of Manitoba presented before the Royal Society since that of 1898. During the last three years the position of the Society has remained unchanged. It still has for its aims historical and scientific research into subjects pertaining to the countries lying between Lake Superior and the Pacific Coast, and during these years it has, as in former times, done effective work.

It still is greatly hindered in its aims by the want of convenient rooms for its purposes. The City Hall of Winnipeg, in addition to the civic departments, accommodates at present the Free Public Library, which possesses about 10,000 books, and the Historical and Scientific Society, with its valuable reference library of about 4,000 volumes.

It is hoped that when the building for the circulating library promised by Mr. Andrew Carnegie is erected, that the Historical Society will receive consideration and be given space within its walls. It was the Historical Society that first instituted the public library; it still has with the City Council a joint proprietorship in it and a share in its management, one of the members of the Society, Dr. Bryce, being chairman of the Library Board. By arrangement with the City Council, the valuable reference library of the Historical Society is accessible to the reading public of Winnipeg, and the public library would certainly be incomplete without it.

Committees.

Of the work of the committees appointed by the Society, the most interesting to the Royal Society will undoubtedly be that of the Archæological and Scientific and the Literature and Publication Committees.

The Archæological and Scientific Committee—Chairman, Dr. J. G. Laird—has had its patience sorely tried in cataloguing its specimens and placing them in cases so as to be seen to most advantage in the limited space allotted to its department; and indeed, the work of increasing the collection has almost been brought to a standstill for want of sufficient room. Nevertheless, during the last three years quite a number of specimens of Indian workmanship have been acquired and a collection of valuable coins and other curios has been placed with the Society as a permanent loan by Mr. Basil Hamilton.

The important scientific collection of the Society has recently been given space in the new university building, where it can be exhibited to greater advantage than in the Society's present quarters.

The Literature Committee—Chairman, Prof. A. B. Baird—has been diligent in acquiring books, rare or out of print on North-west subjects, and the Society's collection of such works is now unique.

In 1899 there was completed a work commenced some years before, viz.: the collecting, classifying and binding of 100 volumes of pamphlets and typical Western newspapers. These are indexed and easy of reference. The most important sets purchased since 1898 were: Bancroft's History of the Pacific Coast States, 39 vols.; the new translation of the Jesuit Relations, 134 vols.; The Frontenac Edition of Parkman's Works, with the Life of Parkman, 17 vols.; Bailey's Cyclopædia of Horticulture, and the completion of Leslie Stephen's Biographical Dictionary, now 73 vols.

Exchanges.

The Society at present receives exchanges of magazines and newspapers amounting to 107; and historical and scientific exchanges of other societies, 167.

Obituary.

The Society has to record with sorrow the loss by death during these years of the following members:—

Honorary Members—Sir Wm. Dawson, C.M.G., and, quite recently, the Marquis of Dufferin and Ava, and the Very Rev. Principal Grant, D.D.

Corresponding Members—Mr. Joseph Fortescue, retired officer of the Hudson's Bay service, who at the lonely posts of the Northwest devoted himself to the study of ethnography. For a paper on "The Ethnography of Hudson Bay," Mr. Fortescue received a medal from l'Institution Ethnographique de Paris.

Dr. G. M. Dawson, C.M.G., prominent in Northwest exploration.

Peter Warren Wentworth Bell, a retired Hudson's Bay Co. officer.

Ordinary Members—Mr. Stephen Nairn, for several years treasurer of the Society, and the Very Rev. James Dallas O'Meara, Dean of Rupert's Land.

Publications.

In the report presented in 1898, a list of publications of the Society was given as far as No. 52. Since that time there have been read before the Society and published the following papers:—

No. 53. "Manitoba Birds of Prey," by A. E. Atkinson.

No. 54. "The Charitable Institutions of Winnipeg," by Mrs. George Bryce.

No. 55. "The Present Status of Natural Science in the Northwest," by the Rev. W. A. Burman, B.D.

No. 56. "On the St. Paul Trail in the Sixties," by W. G. Fonseca.

No. 57. "Early Red River Culture," by Mrs. George Bryce.

No. 58. "Notes and Observations of Travels in the Athabasca and Slave Lake Regions in 1899," by W. J. McLean.

No. 59. "The Early Icelandic Settlements in Canada," by Capt. Sigtr. Jonasson.

No. 60. "The Insectivorous Birds of Manitoba," by A. E. Atkinson.

No. 61. "Britain's One Utopia," by Frank L. Hunt.

No. 62. "Madame Lagimoniere: The First White Woman to Settle in the Northwest," by Abbé Dugast. Translated by Miss Jessie Morice.

With annual reports 1899, 1900, 1901.

Finances.

Besides the fees of the members and privileges of accommodation, heating and light afforded by the civic authorities, the Society receives an annual grant from the Provincial Government of $250, and a like grant from the city of Winnipeg of $200.

XVII.—From *The Toronto Astronomical Society*, through MR. A. HARVEY.

The following are the names of the officers of the Society for the year 1901:—

Honorary President—The Hon. Richard Harcourt, M.A., K.C., M.P.P., Minister of Education, Ontario.

President—G. E. Lumsden, F.R.A.S., 57 Elm Avenue, Rosedale, Toronto.

1st Vice-President—R. F. Stupart, F.R.S.C., Director of the Toronto Magnetic Observatory, and Superintendent of the Meteorological Service of Canada.

2nd Vice-President—C. A. Chant, M.A. (Tor.), Ph.D. (Har.), Lecturer in Physics, University of Toronto.

Treasurer—C. P. Sparling, 13 Isabella Street, Toronto.

Corresponding Secretary—W. Balfour Musson, 37 Yonge Street, Toronto.

Recorder—J. E. Maybee, M.E., 103 Bay Street, Toronto.

Librarian—Z. M. Collins, 172 Borden Street, Toronto.

Assistant Librarian—A. Elvins, 101 Willcocks Street, Toronto.

Curator—D. J. Howell, Lambton Park.

Other Members of Council—*Honoris Causa*: A. Elvins, past president; L. W. Smith, D.C.L., K.C., past president; J. A. Paterson, M.A., past president; Arthur Harvey, F.R.S.C., past president. *Elected*: Rev. R. Atkinson, A. F. Miller, Capt. J. G. Ridout.

Patron of Astronomy—Larratt W. Smith, D.C.L., K.C., etc.

The eleventh annual meeting of the Society was held on the 10th of January, 1901, in the Society's rooms, at the Canadian Institute, and was largely attended, and the president, Mr. G. E. Lumsden, read the annual address, entitled "The Threshold of a New Century." Mr. Larratt William Smith, K.C., D.C.L., past president of the Society, presented to it his fine three-inch refracting telescope. After the reading of the president's address, the rooms of the Society were thrown open, and the new electric-lantern was used to project on the screen slides made from the admirable Paris photographs of the moon, the originals of which were displayed in the library.

At the meeting on the 22nd of January, an interesting paper was read by Mr. Arthur Harvey, F.R.S.C., past president, on "The Sun," in the course of which he referred to the photospheric surface of the sun, disturbed as it sometimes is by spots, faculæ and prominences, and held that spots ought to be considered as an effect of some interior change. He developed the theory announced in previous papers, that the electric energy of the sun was the cause of changes in the brightness of comets' tails and of his own corona, and having spoken of the chemistry of the sun, declared that the lesson of the whole, if there was one, was that the cosmos from its stars to the dust of the earth, from the huge sun and the still larger stellar orbs to the smallest vagrant comet, is the development of one design, the operation of one law.

On the 5th of February Mr. Andrew Elvins, past president, read a paper entitled "Notes on World Formation by Accretion," and a paper was read from Mr. W. F. Denning, F.R.A.S., a corresponding Fellow of the Society, residing in Bristol, England, on "The Planet Jupiter and his Markings."

The open meeting on the 19th of February was given up to popular papers on "Taurus and the Pleiades," by Mr. John A. Paterson, M.A., past president; on "The Spring Constellations," by the Rev. Robert Atkinson; on "The Zodiacal Light," by Mr. Andrew Elvins, and on "The Belt of Great Stars from Sirius to Vega," and "The Milky Way, its Clusters, Nebulæ and Coalsacks," by the president.

On the 2nd of March, Dr. Larratt Smith, formally presented his telescope and received an address from the Society, which had, in the meantime, elected him a "Patron of Astronomy."

At the meeting of the 5th of March, Mr. A. F. Miller, the president, the Rev. Robert Atkinson and others made reports with respect to the new star in Perseus, which was first seen on the 22nd of February.

At the open meeting on the 19th of March, Mr. George Ridout described his courteous reception by Sir Robert Ball, on the occasion of his recent visit to the Observatory at Cambridge University. Mr. Arthur Harvey read a paper on "Synchronism of Northern and Southern Auroræ," with especial reference to the reports of Mr. Henryk Arctowski, Meteorologist of the Belgica Antarctic Expedition. Mr. Z. M. Collins also read a paper on "Theories of the Aurora," and a series of short papers relative to the Planet Mars was read by Capt. J. G. Ridout, Mr. John Phillips, Mr. J. H. Weatherbe, and the president. Mr. Weatherbe described how the apparent loops of the planets on the sky may be observed and plotted.

On the 2nd of April, Mr. R. F. Stupart, F.R.S.C., and first vice-president, read a paper on "Sun Spots and Precipitation," in which he stated that it is conceivable that a varying solar heat radiation during a sun-spot cycle may cause appreciable changes in the movements of high and low pressure areas, changes perhaps largely influenced and governed by a fluctuating intensity and position of the sub-tropical belt of high pressure in corresponding seasons of different years.

The open meeting of the 16th of April was given up to popular demonstrations of subjects relating to the moon. The papers contributed were by the Rev. Robert Atkinson, Mr. J. Edward Maybee, Mr. A. Elvins, and the president, but more particularly by Dr. J. J. Wadsworth, M.A., president of the Simcoe Astronomical Society.

The meeting of the 30th of April was also of a popular character. Papers were read by Miss E. A. Dent, on "Caroline Herschel"; by Mr. J. R. Collins, on "Faraday"; by Mr. A. F. Miller, on "Wollaston," and by Dr. A. D. Watson, on "Olbers."

At the meeting of the Society on the 14th of May, Council was authorized to purchase from Cooke & Sons, of York, England, a first-class four-inch refracting telescope. The secretary read a paper by Mr. Joseph Pope, C.M.G., on "Halley's Comet," the next apparition of which will occur in 1910. Mr. Harvey also read a paper on "Great Comets."

On the 28th of May, Mr. A. T. DeLury, B.A., Dean of the University of Toronto and Lecturer in Physics, read a paper on "The Shape and Size of the Earth."

On the 11th of June, M. Camille Flammarion, of Paris, France; M. Maurice Loewy, Director of the Paris Observatory, and John A. Brashear, D.Sc., F.R.A.S., of Allegheny, Pa., were elected Honorary Fellows of the Society. A special paper on "The Albedo of the Moon," was contributed by Professor H. H. Kimball, associate editor of the United States Weather Review.

On the 25th of June, letters from Dr. J. A. Brashear and Mr. W. F. King, Government Astronomer at Ottawa, were read, descriptive of the Dominion Government Observatory to be erected at the capital. The papers of the evening were of a popular character, and were contributed by Mr. J. H. Weatherbe, Mr. D. J. Howell, Mr. A. Harvey and the Rev. R. Atkinson, on "The Summer Constellations." At this meeting the Society adjourned for the summer holidays, and arrangements were made for open-air meetings in the interests of the Society, the public and the schools, to be held in different parts of the city, and work for members going to Muskoka and elsewhere was laid out.

At the meeting on the 17th of September, Mr. J. C. Hamilton, M.A., LL.B., read a paper on "The Pleiades in the Classics and Mythology."

On the 15th of October, Mr. W. B. Musson read a paper on "Stellar Evolution as Indicated by Spectrum Analysis," special reference being made to the work of Sir William Huggins, an Honorary Fellow of the Society.

On the 29th of October, Mr. A. Elvins presented his three-inch telescope to the Society, and received its thanks in the form of an address. Mr. C. A. Chant (Tor.) Ph.D. (Harv.), vice-president of the Society, contributed a paper on "Some New Aspects of Ether Waves."

At the meeting on the 25th of November, numerous observations with respect to a brilliant meteor which passed over the province on the night of the 9th of July were reported by observers both in Toronto and elsewhere. The Rev. R. Atkinson read a paper on "What may be done with a Three-inch Telescope."

On the 10th of December, Mr. R. F. Stupart read a paper on "Electrical Disturbances during Auroral Displays."

At the annual meeting on the 23rd of December, papers were read by Mr. A. F. Miller, entitled "Observations of Nova Persei"; by Prof. Fessenden, of the United States Weather Bureau, on his "Explanation of Inertia and Gravitation"; by Prof. G. F. Hull, of Dartmouth College, Hanover, N.H., on "The Pressure of Light and its Application to Astronomical Problems," and by the president, on the work of the year, which had been very satisfactory, and the predictions of the principal phenomena for the year 1902.

The following officers for the year 1902 were elected:—

Honorary President—The Hon. Richard Harcourt, M.A., LL.D., K.C., M.P.P., Minister of Education, Ontario.

President—R. F. Stupart, F.R.S.C., Director of the Toronto Magnetic Observatory and Superintendent of the Meteorological Service of Canada.

1st Vice-President—C. A. Chant, M.A. (Tor.), Ph.D. (Har.), Lecturer in Physics, Toronto University.

2nd Vice-President—W. B. Musson, 37 Yonge Street, Toronto.

Treasurer—J. E. Maybee, M.E., 103 Bay Street, Toronto.

Secretary—J. R. Collins, 131 Bay Street, Toronto.

Recorder—J. E. Webber, 6 Sultan Street, Toronto.

Librarian—Rev. R. Atkinson, 498 Ontario Street, Toronto.

Curator, R. Duncan, 516 Ontario Street, Toronto.

Editor—A. Harvey, F.R.S.C., 80 Crescent Rd., Toronto.

Other Members of Council—*Honoris Causa*: A. Elvins, past president; L. W. Smith, D.C.L., K.C., past president; J. A. Paterson, M.A., past president; A. Harvey, F.R.S.C., Hon. President El. Institutio Solar Internacional, Monte Video, past president; G. E. Lumsden, F.R.A.S., Sociétaire de la Société Astronomique de France, etc., past president. *Elected*: A. F. Miller, Rev. T. C. Street-Macklem, M.A. (Cantab.), LL.D., D.D. (Trin. Coll., Tor.), Provost of Trinity College, Toronto; A. D. Watson, M.D. (Vic.).

The annual report of the Society, in addition to the usual matter, contains an illustrated appendix dealing with the nebula surrounding Nova Persei, etc.

XIX.—From *The Ontario Historical Society*, through MR. BARLOW CUMBERLAND.

During the past twelve months the Society has been able to accomplish some good work.

The last annual meeting was held in Belleville, and the next will be held in Peterboro and Lindsay on the 4th and 5th of June, respectively.

A general meeting was held on the Industrial Fair grounds, Toronto, during the fair—Aug. 30th last.

During the year there have been five meetings of the Society's Council, six meetings of a committee appointed to arrange for a Simcoe monument, and several meetings of sub-committees.

Since last report we have issued Vol. III. of our papers and records, pp. 200.

The Society's membership now includes:—

Ex-Officio Members	38
Honorary Members	6
Corresponding Members	6
Ordinary Members	216
	264

The following is a list of officers for the year:—

Ex-Officio—His Excellency, The Earl of Minto, Gov.-Gen. of Canada; The Right Hon. The Earl of Aberdeen, Haddo House, Aberdeen, Scotland; His Honour, The Hon. Sir Oliver Mowat, K.C., LL.D., G.C.M.G., Lieut.-Governor of Ont., Toronto; Hon. Clifford Sifton, Supt.-Gen. of Indian Affairs, Ottawa, Ont.; Hon. Geo. W. Ross, LL.D. (formerly) Minister of Education, Toronto; Hon. Richard Harcourt, M.A., K.C., Minister of Education, Toronto; Dr. Douglas Brymner, Dominion Archivist, Ottawa, Ont.; Rev. Geo. M. Wrong, M.A., Professor of History, University of Toronto; James Mavor, Professor of Constitutional History, University of Toronto; Rev. G. G. Ferguson, Professor of History, Queen's University, Kingston; Rev. O. Rigby, M.A., Professor of History, Trinity University, Toronto; Albert H. Newman, D.D., LL.D., Professor of History, McMaster University, Toronto; A. R. Bain, M.A., LL.D., Professor of

History, Victoria University; Rev. D. Sullivan, O.M.I., Professor of History, University of Ottawa; J. W. Tupper, M.A., Ph. D., Professor of English Literature and History, Western University, London, Ont.; David Boyle, Director Provincial Archæological Museum, Toronto.

Honorary Members—Rev. Canon Bull, M.A., Niagara Falls, South; J. G. Hodgins, LL.D., Historiographer of Ontario, Toronto; William Canniff, M.D., Port Carling, Ontario; Benjamin Sulte, F.R.S.C., Ottawa; James Bain, Jr., Toronto, Ont.; Rev. W. H. Withrow, LL.D., Toronto.

Deceased—Rev. Henry Scadding, D.D., Toronto; Mrs. S. A. Curzon, Ulster St., Toronto; William Kingsford, M.A., LL.D.

Corresponding Members—General J. S. Clark, Auburn, N.Y.; Frank H. Severance, Buffalo, N.Y.; Gabriel Gravier, Rouen, France; Reuben Gold Thwaites, Madison, Wisconsin; Rev. George Bryce, LL.D. Winnipeg, Manitoba; Hon. J. H. Steere, Sault Ste. Marie, Michigan, U.S.A.

Officers for the year:—

Honorary President—Hon. Richard Harcourt.

President—Jas. H. Coyne, B.A.

1st Vice-President—C. C. James, M.A.

2nd Vice-President—Geo. R. Pattullo.

Secretary *pro tem*—David Boyle.

Treasurer—Frank Yeigh.

Council—The above officers and Mrs. M. E. Rose Holden, Mrs. J. H. Thompson, Miss M. A. FitzGibbon, Mr. A. McLean Howard, Mr. Barlow Cumberland, Mr. Boyle and all the Presidents of local societies.

XX.—From *The Women's Canadian Historical Society of Toronto*, through Mrs. Forsythe Grant.

The meetings of the W.C.H.S. have been most faithfully held and attended during the past year, and the intelligent interest shown by the members in the history of their beloved country has been encouraging to the organization, as well as to the officers of the Board.

The resolution passed endorsing the change in the date of holding the last meeting in April instead of May, has lessened the number of papers to be prepared and read, and the series arranged can, therefore, be more condensed.

"The coming of the United Empire Loyalists," and the "Settlement of the Loyalists," began the series of personal histories of those who braved the frightful hardships of a new life in a new country; those men, who with their families came to make the history of this great

Dominion, forsaking the land of their birth and homes, in order to renew their allegiance to their Sovereign. Their descendants, having in many cases come to York—histories of churches, buildings and streets were put, after earnest research, into excellent papers and read at each meeting, thereby bringing the members into closer touch with the historical associations of their own town.

For the first time, we have had the great pleasure of two papers from gentlemen; one from the diary of a British officer in the early part of the last century, and another on the "Boundary Question"—a uniting of old and new threads of history, most instructive and interesting.

The women's memorial to Her late Majesty, the Great Queen Victoria, having been set on foot in the shape of a 10 cent collection from each woman in the city, it was thought advisable to endeavour to increase the fund by a combined effort. Therefore, on the 23rd day of May, 1901, the eve of the birthday of our revered Sovereign, the "Women's Edition" of the Daily Star was issued as a memorial number, with very artistic and appropriate cover. The sale added largely to the sum in bank, deposited towards the erection of our hall, now so sadly needed by our historical and patriotic societies.

Following the example of the W.H.S. of Ottawa, a question drawer and information bureau were established and proved of service to many.

Correspondence with other historical societies throughout the Dominion has been inaugurated, in order to form a federal union; one result of which has been the formation of the London and Middlesex Historical Society.

Many excellent and valuable donations of books, papers, photographs and pictures, including a signed engraving of Hayter's portrait of Her Majesty, Queen Victoria, an engraving of Hoppner Meyer's of the late Chief Justice of Upper Canada, Sir John Beverley Robinson, and also one of Colonel De Salaberry of Chateauguay fame have been received by the Society, which feels the need of a home for its treasures, now accumulating each year.

We, in common with all interested in the history of our country, deeply deplore the death of our revered first honorary member, the Rev. Dr. Scadding, whose work in Canadian history and literature will keep his memory green for many generations.

We especially owe a tribute to his memory, in that he was the mover of the resolution passed at the meeting of the Pioneer and Historical Association of Ontario which thereby authorized the formation of the Women's Canadian Historical Society of Toronto.

Officers.

Hon. President—Miss Mowat.
President—Mrs. Forsyth Grant.
1st Vice-President—Mrs. Jas. Bain.
2nd Vice-President—Mrs. Edward Leigh.
Treasurer—Miss Evelyn Cox, 8 Wellesley Place.
Cor. Secretary—Miss FitzGibbon, 71 Brunswick Ave.
Rec. Secretary—Miss Constance Boulton.

Executive Committee.—Miss S. Mickle, Miss Curzon, Miss Ellerby, Mrs. John A. Paterson, Miss Louise Beard, Mrs. Willoughby Cummings.

XXI.—From *The Niagara Historical Society*, through Miss Carnochan.

In presenting our report we are pleased to be able to say that as regards number of members, publications, meetings, papers read, additions to our historical room visitors, our work has not fallen behind that of other years. In our last report we chronicled a new departure—the marking of historic spots, and we have found with this as is frequently found in life, one step taken leads to others, work accomplished opens the way to new discoveries. Seven markers in all were placed and one of these, marking the house built by the Count de Puisaye in 1798, half of which still stands, led to the gaining of much valuable information, as it has been found by our Society that there are descendants of the brother of the Countess, that the portraits of the Count and Countess are in existence here, that the sword presented to the Count, by the celebrated statesman, William Pitt, is in Toronto, owned by a kinsman of the Countess.

We have now between forty and fifty members, resident and non-resident, about equally divided. We have published during the year, No. 8 Family History,—The Servos family and the Whitmore family, by Wm. Kirby, F.R.S.C., Robert Land, by John Land, and the Jarvis letters, by Mrs. Fitzgibbon, and we are now publishing inscriptions and graves in the Niagara Peninsula, containing references to fifty graveyards and a paper prepared by Col. Cruikshank is to be published next.

We exchange with twenty societies and have distributed during the year 400 copies of our publications. The historical room has been visited by many strangers and numerous additions have been made to it, our collection now numbering 1,500 articles. An historical column still appears at intervals in our local paper.

Monthly meetings were held during the winter and the following papers read:—

Count de Puisaye, a forgotten page of history; Inscriptions and graves in the Niagara Peninsula, by the President; Reminiscences of Henry Oakley and Mrs. Quade; Reminiscences of David and Andrew Kemp, by Mr. D. K. Goodfellow, Beauharnois, Quebec.

A grant from the county and from the Ontario Government has enabled us to print as we have done.

In a visit of your delegate to the Archives at Ottawa last year, it was found that several maps were in existence of military buildings in Niagara and two of them we have had copied and framed for our room.

At the last meeting of the Ontario Historical Society, a resolution was passed offering us assistance with regard to the use made of the remains of Navy Hall as a stable, and by command of Col. McDonald this has been discontinued.

At the late visit of the Prince and Princess of Wales to our historic town, our publications were sent for their acceptance and an acknowledgment was received by our Society.

Our principal and most pressing need is a larger and more accessible room, which shall be fireproof, and any advice of assistance in this direction will be gratefully received.

We rejoice to know that so many historical societies are being formed, and that our country is at last becoming awake to the need of gathering and preserving historical information.

Officers, 1901-02 :—

Patron—Wm. Kirby, F.R.S.C.

President—Miss Carnochan.

Vice-President—Henry Paffard.

Secretary—Alfred Ball.

Treasurer—Mrs. S. D. Manning.

Curator—Miss Carnochan.

Committee—Rev. J. C. Garrett, Rev. N. Smith, R. L. Barron, B.A., Mrs. T. F. Best, W. J. McClelland.

XXII.— From *The United Empire Loyalists' Association of Ontario,* through Rev. C. E. Thomson.

During the two years which have nearly passed since June, 1900, there have been held sixteen general meetings.

Twelve papers have been read at various times by members of the Association, and by others, who have kindly favoured the Association with their contributions.

The following is a list of the papers:—

"The Scotch U. E. Loyalists, by A. C. Cassellman.

"The Moral Character of the U. E. Loyalists," by the Rev. Chancellor Burwash.

"Patriotic Societies, their value to the Empire," by R. E. A. Land, president.

"A Canadian U. E. Loyalist at Waterloo," by Rev. Canon MacNab.

"The Battle of the Thames, and the Death of Tecumseth," by J. S. Arnold.

"A National Monument to Laura Secord," by R. E. A. Land.

"The First Christmas in Canada," by J. H. Long.

"The late Loyalists of Upper Canada," by J. S. Carstairs.

"The Crown and the Empire," by M. DeThierry.

"Reminiscences of Captain John DeCew," by Mr. H. H. DeCew.

"The late Parker Allen, Esq., of Adolphustown," by Rev. C. E. Thomson.

A paper was read from the Quarterly Review of 1899, by J. S. Carstairs, on "The Loyalists of the American Revolution."

On May 3rd, 1901, the first annual planting of a Loyalist tree took place near the Red River Volunteer Monument in the Queen's Park.

On May 21st, 1902, the second annual tree planting took place at the Alexandra Gate in the Queen's Park. On both occasions the trees were planted by the president of the Association, R. E. A. Land, Esq., assisted by a number of ladies and gentlemen, members of the Association, and others.

On October 11th, 1901, a loyal address was presented to Their Royal Highnesses the Duke and Duchess of Cornwall and York, who were visiting Toronto.

This Association joined with other bodies in remonstrances against the erection at Quebec of a proposed monument to General Montgomery.

These remonstrances, addressed to the proper authorities, happily had the desired effect, and a threatening occasion for ill-feeling between Canada and the United States was taken away. For this result much credit is due to the courageous and untiring efforts of Mrs. Fessenden, of Hamilton, and also to the action of societies of women, historical and patriotic, who took a great interest in the matter.

The United Empire Loyalists' Association have much pleasure in stating that their numbers are increasing, and especially that branches are being formed in Ontario, of which there are recent instances at St. Catharines, and at the head of the Lake, with headquarters in Hamilton, which promises to be a very successful branch. An interest has also been created in England, and a movement is on foot to establish corresponding branches in the Mother Country.

An effort has been made to publish for the benefit of the Association, and of the Dominion generally, some old reports of the Commissioners on U. E. Loyalists' claims, which, strangely enough, have been preserved in the United States, and which we have been allowed to examine and partially to copy. But the expense, although the work has been carefully managed by Mr. James Bain and the late Mr. Haight, has been very considerable, and will be greater, if the project is carried through. The Ontario Government has generously helped in this matter.

The Association feels most keenly the difficulty of obtaining and preserving records and relics of the past. As to obtaining them, it is important that no more time should be lost.

As to preserving them some secure provision of a suitable building ought to be made.

The Wentworth Historical Society, and especially the women of that society, will, perhaps, allow us to congratulate them on the hopeful beginning which has been made both at Dundurn and Hamilton, and at the battle ground of Stoney Creek. The Wentworth Historical Society have shown great and praiseworthy zeal in this matter. And much the same may be said of the historical societies at Lundy's Lane, Niagara, and other places in Ontario.

List of Officers:

President—R. E. A. Land.

Vice-Presidents—Rev. C. E. Thomson, G. A. Maclaurin, John A. Macdonell, of Alexandria; Lieut.-Col. Tisdale, of Simcoe; Mrs. Dignam.

Vice-Presidents (ex-officio)—Capt. John D. Servos, Pres. Virgil Branch; Chief Jacob, S. Kahnonkwenyah; Chief Samson Green Annosothkah, and all other presidents of local branches.

Hon. Secretary-Treasurer—Wm. Hamilton Merritt.

Hon. Assistant Secretary—Miss Nina Mary Clarkson.

Hon. Legal Adviser—E. M. Chadwick.

Executive Committee—H. H. Cook, A. C. Casselman, J. S. Carstairs, M. Stanley Boehm, T. S. Arnold, Rev. Canon A. W. MacNab, Lieut.-Col. Shaw.

Ladies' Committee—Mrs. Henry Cawthra, Mrs. G. Kerr, Mrs. Forsyth Grant, Miss Clarke, Mrs. Carey, Miss Dickson, Mrs. Dignam, Miss Merritt, Mrs. McBean, Mrs. Hicks, Miss Widner, Mrs. Bryce Thomson.

XXIII.— From *The Women's Wentworth Historical Society*, through MISS MINNIE JEAN NISBET,

At our last annual meeting our Society laid out a plan of work for the year which included lectures, historical papers, etc. But owing to the illness and death of Mr. John Calder, husband of our president, all work was postponed. Mrs. Calder was one of the three trustees for our Battlefield Park at Stoney Creek, and always took an active interest in all matters relating to our Society. When the Angel of Death called him, a few days before Christmas, the Women's Wentworth Historical Society lost one of its best friends.

When the Duke and Duchess of Cornwall and York visited Hamilton, we refrained from troubling them with any address, but we sent to the Royal yacht Ophir copies of our publications and large photos of the battlefield and the old historic house, and received a letter from the Duke's private secretary, Sir Arthur Bigge, expressing the pleasure their Royal Highnesses took in looking over the books and pictures on their homeward voyage.

In commemoration of the visit of the King's son, we had a maple tree planted on the battlefield by Alexander Muir, at our anniversary celebration in October, when a chorus sang Canada's National anthem, "The Maple Leaf Forever." Appropriate speeches were made by Major Hendrie, E. D. Smith, M.P., and H. Carscallen, M.L.A.

On Victoria Day we were favoured with a visit from Frank Yeigh with his sixth annual historical party, and the guests seemed to enjoy our quaint old house, which still contains bullets and one shell from the battle of 1813, as well as many relics, old furniture, etc.

An interesting feature was the presence of Abraham Gorman, of Stoney Creek, who told the story of the capture of his father, Isaac Gorman, by the Americans, June 5th, 1813, how he obtained his release, also the countersign which he told to Billy Green, the scout, who, in turn, gave it to General Vincent, the memorable night of the battle. Mr. Gorman, who is seventy-nine years of age, has an excellent memory for tales of the past.

Mrs. J. Rose Holden stated that she had the diary of an intimate friend of Billy Green's which corroborated the story of the countersign, which has been a cause of much controversy.

Inspector J. H. Smith talked of the battle and its great power in saving Canada for the British Crown. He made us feel quite proud because we had secured this historic spot for preservation.

We extend a cordial invitation to all members of the Royal Society to come and visit Stoney Creek Battlefield Park. Our latch hangs out for you at all times.

We also were the first society to move for a memorial to our beloved queen, and the Queen Victoria Memorial Statue committee, organized by us, has now about $5,000 in the bank towards a monument to be erected in Gore Park, and much more is promised.

XXIV.—From *The Miramichi Natural History Association*, through DR. FOWLER.

Since sending in our last report we regret to have to state that our late patron, Dr. Dawson, has been removed by death. This Association and the public at large, or at least the scientific world, has thus suffered an almost irreparable loss.

His heart was in his work, and he counted no labour too great that tended to further scientific investigation and knowledge.

The Association nominated Lieutenant-Governor Snowball, and he has kindly consented to act as our patron and to do all he can to further our interests.

MEMBERSHIP.

The following is the number:—

Honorary Members	2
Members	35
Associate Members	49
Corresponding Members	12

TREASURER'S REPORT.

Balance on hand February, 1901	$ 54.33
Membership fees, sale of bulletins, etc.	37.55
Government grant	99.75
	$191.63

Per Contra.

Current expenditure	$ 37.80	
Cases, fittings & repairs for Museum	103.00	
Balance on hand	50.83	
		$191.63

MUSEUM.

Under this head the Association wish to report that they have procured two large modern glass cases, one for birds and one for animals, and there is still a large quantity of material on hand which requires the same care, and which we hope to provide the coming year.

As the Museum grows in size and is being properly arranged, it becomes more and more attractive, a fact evidenced by the increased interest shown by the public and the large number of visitors frequenting the rooms.

BOTANY.

Work in this department has been carried on satisfactorily; about one hundred plants having been mounted. Some preliminary work, looking to a scientific collection of the cryptogams, has been done.

ORNITHOLOGY.

A large number of birds were added to this collection, and members and friends continue to supply new specimens.

ICHTHYOLOGY.

Several alcoholic specimens of native fishes and some interesting forms from abroad, together with two mounted sharks from the Miramichi Bay were procured.

HERPETOLOGY.

Something additional has been done in this department.

INVERTEBRATE ZOOLOGY.

Satisfactory progress is being made here. Several new specimens of Coleoptera and Lepidoptera, not before reported in the northern part of the province, were secured.

LIBRARY.

A reference to the list of donations will show that a large number of scientific exchanges and other works have been received.

MEETINGS, PAPERS, LECTURES, ETC.

During the course of the year, regular monthly meetings were held, and during the winter and spring months weekly meetings and lectures, as will be seen by the accompanying list, all of which were well attended and much interest exhibited.

The meetings, subjects discussed, etc., are to be seen in the following abstract of proceedings:—

1901.			
Feb.	12.	Anniversary Address	Dr. Baxter.
	19.	Magic Lantern Views	J. D. B. F. McKenzie.
	24.	"Circulation of the Blood"	Dr. Baxter.
Mar.	5.	"Circulation of the Blood"	Dr. Baxter.
	12.	"The Blood in Health"	Dr. Baxter.
	19.	"A Year with Buller in South Africa"	Sergt. Major Cox.
	26.	"Outlines of the Solar System"	Mr. James Nicol.
April	2.	"The Blood in Health"	Dr. Baxter.
	9.	"The Blood in Disease"	Dr. Baxter.
	16.	"Anæmia"	Dr. Baxter.
	23.	"Bacilli"	Dr. Baxter.
	30.	"On Instinct"	Dr. Cox.
May	7.	"On Instinct"	Dr. Cox.
	14.	"A Talk on Fishes"	Dr. Cox.
Oct.	24.	"Old Roman Coins"	Mr. MacLachlan.
Nov.	12.	"The Migration of Birds"	Mr. J. Hughes Samuels, Toronto.
1902.			
Jan.	14.	"The Snakes of New Brunswick"	Dr. Cox.
	21.	"The Nests of Bees and Wasps"	J. D. B. F. McKenzie.
	28.	"Continuation of same	J. D. B. F. McKenzie.
Feb.	4.	"The Anatomy of the Teeth"	Dr. H. G. Vaughan.

DONATIONS TO MUSEUM AND LIBRARY.

The Sword of a Sword Fish	H. Brobecker.
A "Goshawk"	A. Brideau, New Jersey.
Fifteen Bulletins of the Natural History Society of New Brunswick.	
A Horned Toad, Sea Horse, Tarantula, Scorpion, Scorpion, Specimen of a Sisal Plant and Rope, Star Fish, Centipede; a bunch of Nictor Beans; a bunch of Whistling Beans; Horned Oyster; specimen of Sea Bean; specimen of Castor Oil Bean; specimen of Prickly Pear; specimens of the Royal Ponciana Bean; the rattle of a rattlesnake from Florida and the Bahama Islands	A Friend.
Specimen of Lignite	George Watt.

Specimen of Shells	Dr. Cox.
Two specimens of Copper Ore from Albert County.	T. W. McLean, St. John.
Specimen of Pig Iron, the first made at the Dominion Steel Works, Sydney, C.B.	Z. Tingley.
Bay Lynx (Lynx Rufus)	Walter Gilbert.
Pintail Duck (Dafila Acuta)	George Morrison.
Stone Gouge, Six Miles Brook, Cains River, Mir.	Lieutenant Donald.
Ruffed Grouse	Dr. Cox.
Drum Fish, Pogonias chromis, Sailor's Choice, Pomadasys fulvomaculatus, Texas	T. A. Cox.
Moth	Miss Perley, Chatham
White-winged Cross Bill.	Dr. Cox.
Specimens of Fishes collected in Algonquin Park, Ontario: River Chub, Red Fin, Horned Dace, Black-headed Minnow, Red-bellied Dace.	Professor Macoun.
Musk Rat; Japanese Rope; French Ventilating Brick; Cedar Burr, a piece of Petrified Tree	A Friend.
Stone Chisel	Henry Gerrish.
Stone Gouge	John Jardine.
Piece of Petrified Wood	Capt. Robert McLean.
Old French Axe, Tracadie.	John Young, M.P.P.
A number of Stone Arrowheads; Stone Axe; Stone Scraper; Nest anl Eggs of Song Sparrow; Nest of Mason Bee	Dr. Cox.
Horse Shoe; French Axe; piece of Spear Head (iron); Musket Ball; Gun Flint; piece of Pottery, Louisbourg, C.B.	Alexander Brown.
Shark	Jas. Davidson, Church Point.
Red-throated Loon	Walter Gilbert.
Pressed Plants, Primula Mistassinica and Lychnis Flos-cucilli	I. F.
Fifty Pressed Plants	Dr. Cox.
A Picked Dog-Fish (Shark)	Wm. Tait.
Stone Axe	Wm. McLaggan, Black Ville.
Petrified Wood	Chester Mowatt.
Cocoa Pod, with Seeds, Dominica, W.I.	D. W. Ward.
Wild Pimento, or Cannon Ball Plant, Georgetown, British Guiana; Silver Ores from Colorado and New Mexico.	D. W. Ward.

Nutmegs with Mace	Mrs. P. A. Noonan.
Nut of an unknown species from an Austrian ship.	S. J. Doyle.
Porcelain Clay from Demerara	P. A. Noonan.
Native Sponges and Lichens from our own rivers and forests	Mrs. Simpson.
Military Woodpecker	Jane Wishart, Tabusintac.
Piece of Petrified Juniper, from sewerage cutting on Queen Street, Chatham	Robert Murray.
Pin Cushion and Cuff Buttons, made from the Big Tree, California	Dr. Baxter.
A Squid	Pilot Capt. Nowlan.
A Shark	Ernest Haviland.
Spotted Salamander	James Allan.
Dovekie	Anthony Adams.
A piece of Petrified Juniper from the digging for the sewerage	George Stothart.
A piece of plank eaten by the Toredo Worm, cut from a plank of a scow, after lying six weeks at Black Brook	John Johnston.
Six specimens of as many kinds of different Birds from the West Indies	Mrs. P. A. Noonan.
Geological Report, 1898, with Maps, Geological Survey Department for year 1900.	
Annual Report, 1900, Early Red River Culture; Transaction No. 57, Notes and Observations of Travels in Athabasca and Slave Lake Region; Transaction No. 58, Early Icelandic Settlements in Canada; Transaction No. 59	Historical & Scientific Society of Manitoba.
Several Scientific Papers from the Bibliographica Physicologica of Paris and Brussels.	
Annual Report, American Museum of Natural History.	
The Polychæna of Puget Sound Region	Boston Society of Natural History, 1900.
Vol 4, No. 1, Records of Australian Museum, Sydney, 1901; Proceedings of Boston Society Natural History, Vol. 29, No. 17; Phenological Observations, Canada, 1899; and Descriptions of Fresh Water Sponge from Sable Island	A. H. MacKay, Nova Scotia.

Vols. IX. and X., 1899-1900, Proceedings and Transactions of Nova Scotia Institute of Natural Science; 12 numbers of *Ottawa Naturalist,* 1900; Vol. III, Nos. 1-4, 1901, *Canadian Antiquarian and Numismatic Journal;* Proceedings of Linnean Society, New York.	
A complete set of Standard Weights and Measures of New Brunswick anterior to Confederation	Municipal Council of Northumberland.
Gold Quartz and other Mineral Specimens from a gold mine in Lunenburg Co., N.S.	Hon. J. B. Snowball & Mr. R. A. Snowball.
Specimens of Coal and Stalactites from Bermuda	Miss Maggie Connors.
Piece of Petrified Lepidodendron, Bay du Vin	A. G. Williston.

This Association has been favoured in having its work freely reported by the press, which has taken great interest in its proceedings.

OFFICERS.

Patron—His Honour Lieutenant-Governor Snowball.

President—Dr. Cox.

Vice-Presidents—D. Ferguson, Esq., and J. D. B. F. McKenzie, Esq.

Corresponding Secretary—Dr. Baxter.

Librarian—Miss Bessie Creighton.

Treasurer—George Stothart.

Curators—Miss K. I. B. McLean, Miss Minnie Edgar, Mr. J. McIntosh, Dr. Baxter and Dr. Cox.

Additional members of the Council—Messrs. J. L. Stewart, W. L. T. Weldon, and Mrs. J. F. Connors.

Secretary—G. B. Fraser.

XXV.— From *The Canadian Forestry Association,* through MR. E. STEWART.

I have the honour to present the following report upon the work of the Canadian Forestry Association for the past year:

This Association, which has now entered upon the third year of its existence, has members and officers in every part of the Dominion, and, as its aims affect every citizen of the country, whether he reside in the prairie districts of the interior of the Continent or the wooded areas of the older provinces as well as that of British Columbia and the west territory of northern Canada, it is evident that its mission is one of great and lasting importance to the people of this country.

It is beginning to be realized, and none too soon, that it will be absolutely necessary to give greater attention than heretofore to the preservation of the timber at the sources of water supply if this country is not to suffer the penalty that has visited others that have continued to pursue the wholesale denudation of the timber of the country and which has been begun in the older provinces of Canada.

The Association has, during the past year, suffered a great loss in the death of Hon. Geo. W. Allan, one of its most active directors.

The third annual meeting was held in Ottawa on the 6th and 7th of March last, and was well attended by members from all parts of the country, and the Association was also favoured by and is deeply indebted to Dr. Fernow, formerly director of Forestry for the Federal Government at Washington and now Principal of the New York State College of Forestry in connection with Cornell University, who was in attendance and also gave an illustrated lecture on the evening of the first day's session.

Interesting papers and addresses were delivered by the following gentlemen:—

"The Growing of Trees in British Columbia," by President Sir Henri Joly de Lotbinière.

"Forestry in Ontario," by Mr. Thomas Southworth.

"The Pulp Industry in Canada," by Mr. D. Lorne McGibbon.

"The Pulp Industry in Canada," by Mr. E. G. Joly de Lotbinière.

"The Forest Tree Planting in Manitoba," by Mr. A. P. Stevenson.

"Forest Tree Planting in N. W. Territories," by Norman M. Ross.

"Pulp Wood," by Mr. Austin Carey, of the State of Maine.

"Timber in British Columbia," by Mr. Anderson, of British Columbia.

Sir H. Joly and Messrs. A. P. Stevenson, Carey and Anderson were unable to be present in person, but their papers were read and will appear in the published report.

Mr. Anderson also furnished the Association with specimens of the different varieties of wood found in British Columbia, and also with a section of a pile showing the disastrous work of the teredo in the waters of the western coast.

The officers for the present year are as follows:—

Patron—His Excellency the Earl of Minto, Governor-General.

Honorary President—His Honour Sir Henri Joly de Lotbinière, Lieutenant-Governor of British Columbia, Victoria, B.C.

President—William Little, Westmount, P.Q.

Vice-President—Hiram Robinson, Ottawa, Ont.

Vice-Presidents for the Provinces and Districts—Ontario: J. B. McWilliams, Peterborough, Ont.; Quebec: Hon. S. N. Parent, Premier of Quebec, Quebec; New Brunswick: Lt.-Col. Hon. J. B. Snowball, Chatham, N.B.; Nova Scotia: A. H. MacKay, LL.D., Superintendent of Education, Halifax, N.S.; Prince Edward Island: Hon. Sir Louis Davies, K.C.M.G., Minister of Marine and Fisheries, Ottawa; Manitoba: Stewart Mulvey, Winnipeg, Man.; Assiniboia: J. S. Dennis, Assistant Commissioner of Public Works, Regina, N.W.T.; Saskatchewan: J. G. Laurie, Battleford, Sask.; Alberta: William Pearce, Calgary, Alta.; Athabasca: F. D. Wilson, Hudson Bay Co., Ft. Vermilion, Atha.; British Columbia: H. Bostock, Ducks, B.C.; Yukon: The Commissioner, Dawson, Yukon; Keewatin: The Lieutenant-Governor of Manitoba, Winnipeg, Man.

Secretary—E. Stewart, Dominion Superintendent of Forestry, Department of the Interior, Ottawa.

Assistant Secretary and Treasurer—R. H. Campbell, Dept. of Interior, Ottawa.

Directors—E. G. Joly de Lotbinière, Ottawa; Wm. Saunders, LL.D., F.R.S.C., Director of Experimental Farms, Ottawa; John Macoun, F.L.S., F.R.S.C., Asst. Director of the Geological Survey, Ottawa, Ont.; Thomas Southworth, Director of Forestry, Toronto; C. Jackson Booth, Ottawa; W. C. Edwards, M.P., Ottawa; C. E. E. Ussher, Montreal.

XXVI.—From *The Women's Canadian Historical Society of Ottawa*, through MRS. G. E. FOSTER.

The Recording Secretary begs to present the following report:—

The Society has now come to the close of its fourth year. It has been, on the whole, one of steady progress. The members continue to show interest in the work, and the papers that have been presented have been of unusual interest. These papers form a valuable nucleus of a new volume, to the publication of which the Society is already looking forward.

At the October meeting, Mrs. Foster, who had been president since the organization of the Society, sent in her resignation, owing to her removal from the city. Her loss was deeply felt, as she had ever been zealous in her efforts to promote the welfare of the Society. As a mark of the Society's appreciation of her efforts, she has been elected a vice-president. Whilst the office of President was vacant, Mrs. Gwynne kindly and efficiently occupied the chair. At the November meeting Mrs. Dawson was elected president by a unanimous vote. During the absence of the treasurer, Mrs. Ahearn, in Europe, Mme. Pigeon kindly consented to act as treasurer. Mrs. O'Connor, recording secretary, who had faithfully performed the duties of that office since organization had also to resign during the year, much to the regret of the Society. The Librarian consented to act as recording secretary until the annual meeting. Another officer who has devoted much time and thought to the work of the Society, viz., the corresponding secretary, Mrs. J. L. McDougall, Jr., is retiring this year. The Society is very grateful to her for all her enthusiastic work on its behalf.

Seven regular meetings of the Society have been held during the year. The Executive has met eight times, having had seven regular meetings and one special. The papers read were as follows:—

1901.

April —"Account of the Settlement of part of Leeds County"—Mrs. J. L. McDougall, Sr.

October —"Sketch of Jane Craig, a Revolutionary Heroine"—Mrs. Ahearn.

"Sketch of Ursuline Convent"—Mme. Lamothe.

November—"Ottawa in 1868" and "A Story of the Cholera in 1832"—Mrs. Kirwan.

"A Reminiscence of the Visit of His Excellency the Earl of Elgin and Kincardine in 1853"—Mrs. Friel.

December—"Schools and Schoolmasters of Ottawa"—Miss Jamieson.

1902.

January—"Phillipsburg"—Miss Read.

February—"The Great Fire of 1870"—Mrs. Bradish Billings.

March —"Industrial Development of Ottawa and Hull"—Mrs. Roper.

The monthly meeting in December was held on the first Friday; and on the second Friday and the Saturday following "Tableaux Vivants" were given in the Orme Hall under the auspices of the Society. These were a great success, financially and otherwise. This success was due to the efforts of a capable committee, consisting of Mrs. Ahearn, convener, Mrs. J. L. McDougall, Sr., Mrs. J. L. McDougall, Jr., Mrs. Goodeve, Mme. Lelièvre, Mme. Lamothe, Mrs. Harold Pinhey, Mrs. H. K. Egan, Miss Ida Hughes and Miss Meach. The Society is also greatly indebted to the ladies and gentlemen, other than members of the Society, who kindly assisted.

At the March meeting, Lady Ritchie and Mrs. Edward Griffin were present as representatives of the Local Council of Women.

The Scrapbook Committee report steady work during the year. Three books are in course of preparation—one, "Local Events," by Miss Masson; a second, "General Events," by Miss Read; and the third, "Ottawa City," by Miss Horsey, convener.

The Treasurer reports a balance on hand of $88.19.

The Librarian reports having sent twenty-eight copies of the transactions, Vol. I., to secretaries and librarians of societies in Canada and the United States. Eleven copies were sent in Canada. Copies of annual reports and transactions have been received in exchange from several of the societies. From the Historical and Scientific Society of Manitoba have been received an annual report and the following papers:—(1) "The Early Icelandic Settlement in Canada." (2) "Early Red River Culture." (3) "Notes and Observations of Travels in the Athabasca and Great Slave Regions in 1899." The Wentworth Historical Society sent a copy of transactions. The Ontario Historical Society sent the same. Copies of the Canadian Historical Quarterly have been received. Sir James LeMoine sent the "Annals of the Port of Quebec," of which he himself is the author.

From the United States we have received the "American Anthropologist," "The Iowa Historical Record," the transactions of the Oneida Historical Society, the transactions for 1899 and 1900 of the State Historical Society of Wisconsin, and the Kansas Historical collection.

The following volumes have also been presented:—

(1) "Recollections of Bytown"—W. P. Lett. Presented by his son.
(2) "History of the Ottawa Valley"—R. Gourlay.
(3) "Memorial volume of Knox Church, Ottawa." Presented by Miss Masson.

This is the first report from the Librarian. She hopes that members of the Society will assist in collecting books written by Canadians and those dealing with Canadian subjects.

The officers elected by the Society at the annual meeting, held April 11th, 1902, were as follows:—

Patron—Her Excellency, the Countess of Minto.
Honorary President—Lady Laurier.
President—Mrs. S. E. Dawson.
1st Vice-President—Mrs. Gwynne.

2nd Vice-President—Lady Ritchie.

3rd Vice-President—Mme. Pigeon.

4th Vice-President—Mrs. Ells.

Vice-Presidents—Lady Bourinot, Lady Davies, Lady Strong, Mrs. Foster, Mrs. Friel, Mme. Girouard, Mrs. G. E. King, Mrs. Goodeve, Mrs. J L. McDougall, Mrs. H. Pinhey, Mrs. Roper, Mrs. Burbidge, Mrs. A. Burritt, Mrs. Chas. O'Connor.

Recording Secretary—Miss Alice Burbidge.

Corresponding Secretary—Mrs. Wallbridge Howard.

Treasurer—Mrs. Ahearn.

Librarian—Miss M. A. Northwood.

Scrapbook Committee—Miss Horsey, convener, Miss Masson, Miss Read.

Executive Committee—Mrs. Sedgewick, Mrs. Martin Griffin, Mrs. Costigan, Mrs. W. W. Campbell, Mme. Lelièvre, Mme. Lamothe, Mrs. H. Allan Bate, Mrs. J. L. McDougall, Jr., Miss Jamieson, Miss Read.

XXVII.— From *The Botanical Club of Canada*, through
DR. A. H. MACKAY, LL.D.

During the year I sent out a circular with copies of reports and other phenological papers to botanists and those likely to take an interest in some department of the work of the Club. I am hopeful of obtaining observers for the report of phenological data from the Yukon to Newfoundland from the tenor of the responses received. It often happens, however, that the daily routine of duties sometimes obliterates a momentary resolve to carry out a continuous series of such observations. But, if only a few observations, even for the spring months alone, can be obtained from the more distant points, the information will be of great interest and worth the general expenditure of time and energy.

The greatest activity in the extension of phenological observations must this year be credited to British Columbia, where the Natural History Society of the province issued a circular to teachers in the public schools, and an admirable schedule specially adapted to the western side of the Dominion. The province of Quebec came next, due mainly to the work of Principal John A. Dresser, M.A., of St. Francis College, Richmond.

The British Columbia schedule provides for the description of the locality, for the meteorological phenomena, for six migration items, seven farming operations, flowering and fruiting of thirteen cultivated plants, and the first flowering and " when becoming common " of fifty-four named and thirty-seven unnamed plants.

In Ontario there has been an accession of a few able observers. In New Brunswick a general exploration of the flora of the island is being organized. In Nova Scotia some steps have been taken in the same direction, under the leadership of local botanists. In the city of Halifax, a local botanical club has been meeting regularly, in the winter studying mainly the marine algæ, and in the summer the flowering plants.

At Canso the Marine Biological Laboratory of Canada was in operation during the summer, under the directorship of Professor Ramsay Wright, of the University of Toronto. Professor James Fowler, of Queen's University at Kingston, paid special attention to the botanical features of the region.

Professor Robertson, of Ottawa, representing Sir William Macdonald, is now encouraging the cult of nature study in the public schools of Canada in a very effective manner. He plans to select some of the most promising teachers in each province and send them away to the best centres of nature study training in the world; then to arrange with the educational authorities to show the effect of good objective nature teaching by a teacher who may have ten rural schools to give instruction in for half a day each week. As such nature teaching must, to a very great extent, be botanical, the movement is one which is not only worthy of observation by this Club, but of notice and of substantial aid.

Canadian botanical literature appears to be regularly growing, as is indicated by a comparison of the report on the Bibliography of Canadian Botany, which has just been presented to the Biological Section of the Royal Society, with the corresponding report of the previous year.

Outside of Canada, Germany leads in the collection of phenological data. Dr. E. Ihne, of Darmstadt, has been publishing annually for several years, observations from about one hundred stations, more or less, extending from Wales to Austria, and from Switzerland to the Baltic; as well as a bibliography of phenological literature for each year. He gives reports in his "Phænologische Beobachtungen, Jahrgang, 1901," (in den Abhandlungen der Naturhistorischen Gesellschaft in Nürnberg). from eighty-six stations; and he published deductions from them on the climate and "middle dates" of spring, etc., for several European stations, somewhat as has been done in the Transactions of the Institute of Science of Nova Scotia, in "Natur und Schule," (I. Band. 1902, 3. Heft. Druck und Verlag von B. G. Teubner in Leipzig).

In Denmark, M. J. Mathiassen, Mullerup Skole. pr. Slagelse, Jan. 1902, issued a schedule of local nature observations for use in the public schools as in Nova Scotia. The introduction of the Nova Scotian plan into Denmark is due mainly to the sketches of it published by an eminent educationist, Carl Michelsen, of Skanderborg, well known in literature and art, and vice-president of the "Union Idéaliste Universelle." The schedule is a preliminary one, providing for over fifty items of observations. In the interesting page of directions to teachers and other observers, the following sentence occurs: " Som en saadan Forberedelse, synes jeg, de Naturiagttagelser, som Hr. Skoleinspektor Michelsen, Skanderborg har gjort opmærksom paa foretages *i kanadiske Skoler*, fortrinlig vil egne sig ". (By way of introduction it appears that the nature-observations carried on *in Canadian schools* and reported upon by Herr Michelsen, of Skanderborg, School Inspector, will preeminently serve).

Phenochron Tables for 1901.

Two tables are here published. First, the Phenological Observations in Nova Scotia, 1901, which are also published in the Transactions of the Nova Scotia Institute of Science. Second, the Phenological Observations in Canada for 1901, which the said Institute publishes from the report of this Club in order to keep the series complete and for the purpose of comparison with local phenochrons.

Nova Scotian Phenochrons.

About 150 schedules of observations were approved from the province of Nova Scotia. These were made in nearly every case by the pupils of as many schools under the direction of the teacher. Pupils on their way to and from school in the rural districts were kept in good-natured rivalry seeking for the first bloom of every kind of plant, shrub, or tree, etc., which the happy discoverer must, if possible, bring to the school room for positive demonstration and exact determination. Over 500 dates of " first flowering " and " when flowering became common " were in some cases determined in one school section.

These 450 schedules were divided between four of our best provincial botanists for study and the compilation of average dates or phenochrons for each meteorological region of the province, namely, C. B. Robinson, B.A., of Pictou Academy; Principal E. J. Lay, of the Amherst Academy; Principal B. McKittrick, B.A., of Lunenburg Academy; and Miss Antoinette Forbes, B.A., of Windsor Academy.

Their reports on the probable mistakes made by some of the observers, with suggestions for improvement in the schedule, etc., were published in the April *Journal of Education,* 1901.

The following paragraph is taken from the directions printed on the schedules to show the care taken to have accurate data:

"To all observers the following most important, most essential principles of recording are emphasized: Better *no date,* NO RECORD, than a WRONG ONE or a DOUBTFUL one. Sports out of season, due to very local conditions not common to at least a small field, should not be recorded except parenthetically, The date to be recorded for the purposes of compilation with those of other localities should be the *first* of the *many* of its kind following immediately after, etc. For instance, a butterfly emerging from its chrysalis in a sheltered cranny by a southern window in January would not be an indication of the general climate, but of the peculiarly heated nook in which the chrysalis was sheltered; nor would a flower in a semi-artificial, warm shelter, give the date required. When these sports out of season occur, they may also be recorded, but within a parenthesis to indicate the peculiarity of some of the conditions affecting their early appearance."

The following comments were made after the study of such schedules from 1892 to 1899, in the Canadian Record of Science, Volume VIII., No. 2, pages 73 to 84:

"The tendency to error is quite observable in a study of the whole of these schedules. The most serious is characteristic of the solitary observer who goes out for his walk of observation perhaps not more than once or twice a week. His plants appear to flower by weekly or semi-weekly spurts; and if certain plants are rare in his locality he may not see them in bloom until, may be, more than a week after they have been in full flower. In the school observations this tendency to error is entirely eliminated, for numbers of individuals are daily wandering to and from school every day with their eyes open for everything, especially when the discoverer of each new phenomenon for the season wins a credit of some kind before the whole school.

"Again, the tyro botanist is at a disadvantage, for he does not know where to look for the rarer species, and when he accidentally comes across them they may have been in flower for some time. It is very likely that the average dates of the flowering of plants in Nova Scotia in the various counties may be slightly affected by this source of error, the counties having the oldest and most enthusiastic botanists appearing to be earlier in season. This may account for the unexpectedly advanced position of Pictou county in the table.

"Then there is the accident of local land inclination or shelter, for the warm intervals on the southern slope of the hill is earlier than the northern slope. To estimate these local effects, the schedules from each county in Nova Scotia from this year forward are to be classified into localities: (1) on the coast, (2) low inlands, and (3) highlands.

"And lastly, some individual plants are naturally earlier than others even when in similar localities, and in the same individual certain twigs and branches are earlier than others. To check such peculiarities an attempt is made to fix the date when the flowering of each species may be said to be 'becoming common.' So that we have the two series of observations for each individual, the 'first appearance' and the 'becoming common.'

"Assuming the observers to be symmetrically placed in a country, to be competent and careful, and to put exactly the same interpretation on what constitutes the 'first appearance' and 'when becoming common,' the averaging of the various observations would give us phenological norms for the comparison of a very important character of the country with that of another, and more especially for the comparison of one season with another in the same country, which after a series of years would contribute to the solution of the problem of the secular variation of climate.

"In order to deal mathematically with phenological dates, averages or means, it is necessary to indicate dates and average or mean dates in terms of the day of the year instead of the days of the month. For the conversion and reconversion of such dates, all that is necessary to make it convenient, is to have before the eye a list of the months of the year with the number of the day of the year corresponding to the last day of each month. . . .

"Now, we may consider a phenological date to be a sort of mathematical function of variables, several of which are already being very systematically and accurately observed and recorded by the meteorological departments of most countries, such as the variations of temperature, of atmospheric pressure, sunshine, precipitation. Then there are local constants, such as latitude, elevation, slope, proximity of bodies of water, and character of the soil. All of these influences affect the phenological date, and conversely the date may be considered as a summation or integration of all these and other more or less unknown elements. We find that in the month of April the season is advancing more rapidly this year than last year, while in May or a portion of May it may be advancing less rapidly according to the varying balance of the meteorological conditions affecting the organisms. Averages of the dates of early flowering plants, for instance, during one season might be compared with those of another season. Averages of a normally later series of flowers might be similarly treated. But to compare one spring with another spring, a series of typical flowers normally flowering in succession from the earliest date to the latest might be taken. Such an average or mean for comparison we might for convenience call a phenological norm or phenochron (a phenological *time* ordinate). Phenochrons for comparison or for the plotting of phenological curves should be based on the same number of observations taken at the same stations under similar conditions, and if they are to correctly represent any district of considerable extent, the stations should be symmetrically distributed."

Returning to the special consideration of the Nova Scotian phenochrons following, the province was mapped out into ten meteorological slopes, basins or "regions," and each region was, as a rule, further subdivided into three "belts"— the coast, low inlands, and high inlands. The dates in each of these "belts" were averaged to find the "belt" phenochrons; and the "belt" phenochrons were averaged to find the "region" phenochrons. In this table the fractions are omitted for lack of space.

The instructions printed on the blanks for these compilations are given below for the full information of those interested. The phenochrons thus found for each region of the province are given in the double ten-columned table, one side giving the "first appearance" and the other the "when becoming common." The ruling of this table is nearly a fac-simile of the ruled blanks prepared for the staff of compilers referred to.

The fourth page of this blank is for the recording of the dates of thunderstorms. But the difficulty of presenting these phenomena in any compact form of tabulation is responsible for their omission in the tables of the present report.

The following are the printed instructions on the compilation blank referred to:

"REGION" OR "BELT" PHENOCHRONS.

Each Province may be divided into its main climatic slopes or regions which may be seldom co-terminous with the boundaries of counties. Slopes, especially those to the coast, should be subdivided into belts, such as (a) the coast belt, (b) the low inland belt, and (c) the high inland belt.

In Nova Scotia the following regions are marked out:

No.	Regions or Slopes.	Belts.
1.	Yarmouth and Digby Counties,	(a) Coast, (b) Low Inlands, (c) High Inlands.
2.	Shelburne, Queens and Lunenburg Counties,	" " "
3.	Annapolis and King's Counties,	(a) South Mts., (b) Annapolis Valley, (c) Cornwallis Valley, (d) North Mts.
4.	Hants and Colchester Counties,	(a) Coast, (b) Low Inlands, (c) High Inlands.
5.	Halifax and Guysboro Counties,	" " "
6.	Cobequid Slope (to the South),	" " "
7.	Northumberland Straits Slope (to the north),	" " "
8.	Richmond and Cape Breton Counties,	" " "
9.	Bras d'Or Slope (to South-East),	" " "
10.	Inverness Slope (to Gulf, N. W.),	" " "

AVERAGING LOCAL PHENOCHRONS FOR "REGION" OR "BELT" PHENOCHRONS.

If ten or fewer good phenological observation schedules can be selected from those belonging to any given belt, they may be averaged as indicated in the columns within. If there are not ten from each belt, then it may be better to combine two belts, or if necessary, the three belts on the form within. In the latter case, the average will be the "region" phenochrons. When a full sheet can be made out for each belt, the average of the phenochrons for the three "belts" will give the phenochrons for the "region."

BLANKS.

There is a convenience in averaging the dates of ten stations, which accounts for the ten columns for stations in the form within. When a few dates are not given, it may be fair to enter in the blanks the dates from a similar and neighbouring station which is not otherwise utilized for the sheet. Great care should be taken that such observations taken from a schedule not summarized should appear to be what might have been observed at the station indicated in the heading; and to indicate such a transference the date should be surrounded by a circle with the pen, which would always mean that the observation was not made in the station heading the column, but in a neighbouring one, and was taken from a supernumerary schedule.

THUNDER-STORMS.

These dates will be entered in their respective columns and opposite the month indicated. They will not be averaged, of course.

ACCURACY.

Care must be exercised in selecting schedules, the observations of which appear to have been carefully observed, neglecting any which give reason for doubt, when selecting for summation on the form within. Great care must also be exercised in copying the figures and entering them, so that no slip may occur. Every entry should be checked. One slip may spoil the effect of all the accurate numbers entering into the summation. In like manner, great care has to be taken in adding and averaging the figures; and for this purpose every sum should be done twice in reverse order, so as to give absolute confidence in the accuracy of the work.

REMARKS.

The compiler filling one of these blanks should keep one copy for himself while sending the other to the compiler-in-chief.

The set of stations on the right, under "when becoming common," must be *exactly* the same as on the left, under "when first seen."

Phenological Observations, Canada, 1901.

This table takes note of merely the date of the first appearance of each phenomenon; and there are only the dates of individual observers given in each column, except the column for Nova Scotia, where the number (fraction omitted) is a phenochron derived from several up to 450 individual dates.

The 450 observers of Nova Scotia are too numerous to be specified here. Their names, addresses and the numbers of observations made are published in the October Journal of Education of Nova Scotia, 1901.

The observers of the Botanical Club outside of the Province of Nova Scotia, from whose schedules the following table is compiled, are as follows:—

Mr. J. Vroom, St. Stephen, New Brunswick; Mr. John MacSwain, Bishop Street, Charlottetown, P.E.I.; Mrs. Annie L. Beckett, Richmond (1), Quebec; Miss Jessie M. Varney, Richmond (2), Quebec; Miss Annie M. Dresser, Nicolet, Quebec; Dr. James Fletcher, F.R.S.C., Ottawa (1), Ontario; Dr. Cephas Guillet, Ottawa (2), Ontario; Miss Alice Hollingworth, Beatrice, Muskoka, Ontario; Mr. B. J. Hales, Macgregor, Manitoba; Mr. Thomas R. Donnelly, Pheasant Forks, Assiniboia; Rev. C. W. Bryden, Willoughby, Saskatchewan; Mr. Percy B. Gregson, Waghorn, Alberta; Mr. J. K. Henry, B.A., Vancouver, British Columbia.

Following the Nova Scotian table (on page cxxxiii.) will be found a plate of phenochrongraphs, illustrating the variations through the ten " regions " of the province of the flowering phenochrons of Nos. 3, 13, 51, 57 and 30 — the Mayflower, strawberry, apple, lilac and blackberry — for " when first seen," and " when becoming common." The curves are plotted from the figures given for the five plants in the preceding table.

The two pages following show curves plotted from the tables of preceding years, picturing the variations of phenochrons through the counties of the province.

PHENOLOGICAL OBSERVATIONS, NOVA SCOTIA, 1901.

Regions 1 to 10—When First Seen.

Number.	Day of the year 1901 corresponding to the last day of each month. Jan .... 31 July .... 212 Feb .... 59 Aug .... 243 March .... 90 Sept .... 273 April .... 120 Oct. .... 304 May. .... 151 Nov .... 334 June .... 181 Dec. .... 365 For Leap Year add one to each except January.	Average for N.S.	1. Yarmouth and Digby	2. Shelburne, Queens and Lunenburg'	3. Annapolis and Kings	4. Hants and S. Colchester	5. Halifax and Guysboro	6. S. Cobequid, (S. Cum. and S. Col.)	7. N. St. Slope (Cum. Col., Pic. & Antig	8. Richmond and Cape Breton	9. Southeast slope to Bras d'Or	10. Northwest slope to Gulf (Inverness)
1	Alnus incana, Willd........	104	104	104	103	97	104	103	107	111	104	103
2	Populus tremuloides, Michx.	109.2	111	116	108	109	108	102	108	107	112	111
3	Epigæa repens, L..........	104.3	96	101	102	94	106	106	108	110	111	109
4	Viola cucullata, Gray	121.5	115	124	121	118	123	118	123	127	126	120
5	V. blanda, Willd	117.7	113	118	118	114	117	114	119	125	120	119
6	Acer rubrum, L	118.4	117	119	116	112	121	112	122	124	122	119
7	Houstonia cærulea, L	134	142	131	141	135	133	121	138	141	....	123
8	Equisetum arvense, L.......	126.6	124	124	122	127	130	127	128	136	133	115
9	Taraxacum officinale, Weber	123 3	116	127	123	120	126	122	125	129	123	122
10	Erythronium Americanum, Ker	130.1	139	154	...	143	128	124	125	120	108	....
11	Hepatica triloba, Chaix ...	129 3	130	118	151	132	....	..	122	....	123	....
12	Coptis trifolia, Salisb	128 9	121	128	125	130	129	128	132	130	133	133
13	Fragaria Virginiana, Mill....	117.7	111	121	113	115	120	114	118	126	122	117
14	" (fruit ripe)......	154	114	160	155	156	161	153	154	165	161	161
15	Prunus Pennsylvanica, L....	139.8	136	142	134	138	142	137	139	146	142	142
16	" (fruit ripe)......	204 8	224	185	181	...	...	...	207	...	227	....
17	Vaccinium Penn. v. Can., Lam	138.8	128	135	136	137	140	137	141	146	145	143
18	" (fruit ripe)......	196.3	182	182	183	179	188	182	194	236	223	....
19	Ranunculus acris, L........	144.5	136	146	135	145	149	138	142	155	151	148
20	R. repens, L..................	149.4	146	155	150	155	153	129	151	159	155	141
21	Clintonia borealis, Raf	146.3	142	148	141	143	143	145	150	153	157	141
22	Trillium erythrocarpum, Mich	140.7	139	144	134	138	144	138	141	....	140	148
23	Trientalis Americanum, Pursh	141.1	133	142	125	140	145	139	145	155	145	142
24	Cypripedium acaule, Ait......	152.3	146	152	151	149	153	160	153	156	159	144
25	Calla palustris. L........	151.9	143	150	157	157	156	...	148	159	145	....
26	Amelanchier Canadensis, T. & G.....	137	131	137	133	134	138	135	137	142	142	141
27	" (fruit ripe)......	190 5	200	182	192	180	181	....	204	....	194	....

PHENOLOGICAL OBSERVATIONS, NOVA SCOTIA, 1901.

REGIONS 1 TO 10—WHEN BECOMING COMMON.

Number.	Day of the year 1901 corresponding to the last day of each month. Jan. 31 July 212 Feb. 59 Aug 243 March 90 Sept 273 April 120 Oct 304 May 151 Nov 334 June 181 Dec 365 For Leap Year add one to each except January.	Average for N.S.	1. Yarmouth and Digby	2. Shelburne, Queens and Lunenburg	3. Annapolis and Kings	4. Hants and S. Colchester	5. Halifax and Guysboro	6. S. Cobequid, (S. Cum. and S. Col.)	7. N. St. Slope (Cum. Col., Pic. & Antig	8. Richmond and Cape Breton	9. Southeast slope to Bras d'Or	10. Northwest slope to Gulf (Inverness)
1	Alnus inca, Willd	110 5	110	112	113	102	110	105	113	117	113	110
2	Populus tremuloides, Michx..	116	118	122	113	111	....	108	118	119	121	113
3	Epigæa repens, L......	112.9	106	113	109	108	112	113	116	120	119	113
4	Viola cucullata, Gray.........	128.4	124	131	129	124	131	123	130	133	133	126
5	V. blanda, Willd..............	125.5	120	127	125	124	126	121	127	131	128	126
6	Acer rubrum, L	125.8	122	128	122	118	129	122	128	133	127	129
7	Houstonia cærulea, L	140.2	149	138	144	139	143	129	146	144	....	130
8	Equisetum arvense, L.........	131.9	130	133	130	134	135	127	136	139	139	116
9	Taraxacum officinale, Weber.	131.4	127	134	131	129	133	129	133	136	131	131
10	Erythronium Americanum, Ker	143.5	164	161	...	148	157	132	130	129	127	....
11	Hepatica triloba, Chaix	135.3	144	116	155	140	....	....	127	....	130	....
12	Coptis trifolia, Salisb.......	135.1	128	134	133	135	135	136	136	136	139	139
13	Fragaria Virginiana, Mill....	128.9	124	132	126	128	132	128	130	134	131	124
14	" (fruit ripe)......	169.9	168	173	166	166	172	166	171	177	170	170
15	Prunus Pennsylvanica, L....	145.1	140	147	138	141	148	144	144	154	148	147
16	" (fruit ripe)......	213.3	210	...	185	..	....	....	224	....	234	....
17	Vaccinium Penn.v.Can., Lam	145.5	137	143	141	146	144	142	146	154	152	150
18	" (fruit ripe)......	215	194	196	....	....	....	....	202	248	235	....
19	Ranunculus acris, L..........	153.7	151	155	149	152	159	152	150	162	156	151
20	R. repens, L......	157	157	161	159	159	163	140	156	163	159	153
21	Clintonia borealis, Raf... ..	151.6	146	153	146	145	153	151	156	154	161	151
22	Trillium erythrocarpum, Mich	146.4	146	150	143	142	149	142	145	....	148	153
23	Trientalis Americanum, Pursh	147.5	139	148	142	144	152	142	150	160	148	150
24	Cypripedium acaule, Ait......	157.8	153	159	149	151	163	163	158	163	167	152
25	Calla palustris, L.............	159.4	162	158	160	162	162	....	151	165	155	....
26	Amelanchier Canadensis, T. & G......................	142.2	137	144	137	140	144	139	141	147	146	147
27	" (fruit ripe).....	200.2	187	196	208	182	.	...	219	....	209	..

PHENOLOGICAL OBSERVATIONS, NOVA SCOTIA, 1901.

REGIONS 1 TO 10—WHEN FIRST SEEN.

Number	Day of the year 1901 corresponding to the last day of each month Jan .... 31 July .... 212 Feb. .... 59 Aug. ....243 March .... 90 Sept .... 273 April...... 120 Oct ....304 May ....151 Nov ....334 June. ....181 Dec.......... 365 For Leap Year add one to each except January.	Average for N.S.	1. Yarmouth and Digby	2. Shelburne, Queens and Lunenburg	3. Annapolis and Kings	4. Hants and S. Colchester	5. Halifax and Guysboro	6. S. Cobequid, (S. Cum. and S. Col.)	7. N. St. Slope (Cum. Col., Pic. & Antig	8. Richmond and Cape Breton	9. Southeast slope to Bras d'Or	10. Northwest slope to Gulf (Inverness)
28	Rubus strigosus, Michx.. ...	156.2	149	156	146	159	158	146	160	165	158	165
29	" (fruit ripe).....	193.9	188	188	175	181	....	....	187	227	211	....
30	Rubus villosus, Ait...........	165.4	161	163	162	158	166	168	164	173	173	166
31	" (fruit ripe)......	225.7	196	229	225	228	232	....	242	....	228	....
32	Kalmia glauca, Ait............	149.9	142	147	139	142	...	....	156	159	164	....
33	K. angustifolia, L......... ...	159.6	141	160	142	148	....	....	169	184	173	....
34	Cornus Canadensis, L....... .	142.3	137	144	140	139	143	138	143	149	146	144
35	" (fruit ripe)......	190.7	183	205	181	180	180	. ..	195	....	211	....
36	Sisyrinchium angustifolium..	155.2	152	155	149	148	156	155	156	163	161	157
37	Linnæa borealis, L............	159.5	157	158	155	155	161	161	157	171	160	160
38	Linaria Canadensis, Dum....	173.7	172	172	168	184	178	....	175	....	159	182
39	Rhinanthus Crista-galli, L...	168	171	167	171	156	172	169	168	170	167	169
40	Sarracenia purpurea, L.......	166	160	163	165	160	163	....	167	171	179	....
41	Brunella vulgaris, L..	169.9	169	169	170	163	171	168	170	177	172	....
42	Epilobium angustifolium, L..	178.4	176	169	185	156	...	....	188	....	185	190
43	Rosa lucida. Ehrh.............	177.6	173	176	172	174	176	171	174	186	184	190
44	Hypericum perforatum, L....	168.5	166	172	176	134	....	....	173	....	....	190
45	Leontodon autumnale, L......	168.6	162	164	163	165	185	166	168	182	172	159
46	Prunus Cerasus (cultiv.)......	143.6	135	144	133	138	147	144	143	157	151	144
47	" (fruit ripe)......	189.5	188	189	181	188	....	...	196	....	195	....
48	Cratægus Oxyacantha, L......	153.8	156	157	149	149	154	152	152	161	....	154
49	C. coccinea, L.................	153.9	154	156	155	145	154	....	155	....	156	156
50	Prunus domestica (cultivated)	144.8	136	145	138	142	148	145	145	159	146	144
51	Pyrus malus (cultivated) early	146.2	139	148	139	142	150	146	145	156	149	148
52	" " late	153.9	150	156	148	143	161	148	153	168	155	157
53	Ribes rubrum (cultivated)...	138.5	134	141	133	133	142	135	139	147	134	147
54	" (fruit ripe)......	187.9	183	188	177	167	180	....	187	208	213	....

PHENOLOGICAL OBSERVATIONS, NOVA SCOTIA, 1901.

REGIONS 1 TO 10—WHEN BECOMING COMMON.

Number	Day of the year 1901 corresponding to the last day of each month. Jan .... 31 July.......... 212 Feb.......... 59 Aug.......... 243 March .... 90 Sept.......... 273 April.......... 120 Oct.......... 304 May.......... 151 Nov.......... 334 June.......... 181 Dec.......... 365 For Leap Year add one to each except January.	Average for N.S.	1. Yarmouth and Digby	2. Shelburne, Queens and Lunenburg	3. Annapolis and Kings	4. Hants and S. Colchester	5. Halifax and Guysboro	6. S. Cobequid, (S. Cum. and S. Col.)	7. N. St. Slope (Cum. Col., Pic. & Antig	8. Richmond and Cape Breton	9. Southeast slope to Bras d'Or	10. Northwest slope to Gulf (Inverness)
28	Rubus strigosus, Michx......	162.9	153	162	153	161	168	150	166	174	169	173
29	" (fruit ripe).......	206	200	199	182	216	....	....	193	232	220	....
30	Rubus villosus, Ait	171.9	167	169	165	162	171	177	173	183	179	173
31	" (fruit ripe).....	238.7	223	238	243	241	....	....	250	....	237	....
32	Kalmia glauca, Ait	200	150	152	245	145	....	....	165	163	170	....
33	K. angustifolia, L....	164.9	150	165	151	151	....	....	175	184	178	....
34	Cornus Canadensis, L..	148.9	143	151	146	149	149	144	149	157	151	150
35	" (fruit ripe)......	213.3	211	208	254	186	....	....	203	....	218	....
36	Sisyrinchium angustifolium..	160.4	157	160	156	156	162	159	161	168	165	160
37	Linnæa borealis, L....	164.7	162	164	159	160	166	166	163	174	164	169
38	Linaria Canadensis, Dum ...	179.3	178	177	175	188	...	....	180	....	165	192
39	Rhinanthus Crista-galli, L....	174.0	173	173	176	160	177	171	175	178	175	182
40	Sarracenia purpurea, L.......	171.5	162	170	170	171	167	....	171	177	184	....
41	Brunella vulgaris, L..........	172.8	165	174	169	167	....	172	176	180	179	....
42	Epilobium angustifolium, L..	181.6	170	165	....	163	....	....	191	196	194	192
43	Rosa lucida, Ehrh..	181.8	180	183	177	179	180	176	178	183	191	191
44	Hypericum perforatum, L....	172.5	172	177	178	140	....	....	176	....	....	192
45	Leontodon autumnale, L.....	178.4	169	171	187	177	195	173	170	....	185	....
46	Prunus Cerasus (cultiv.)	150.4	141	151	141	144	155	152	149	164	156	151
47	" (fruit ripe).......	203.7	208	210	188	210	...	....	208	...	198	....
48	Cratægus Oxyacantha, L.....	160.4	162	161	160	158	....	155	157	166	..	164
49	C. coccinea, L.	160.5	162	159	162	160	161	....	159	....	162	159
50	Prunus domestica (cultivated)	150.0	144	152	142	147	152	150	150	163	150	150
51	Pyrus malus (cultivated) early	152.1	148	155	144	149	156	150	150	162	155	152
52	" " late	159.7	159	161	151	154	167	153	158	170	159	165
53	Ribes rubrum (cultivated)....	144.2	139	147	141	140	148	140	144	151	141	151
54	" (fruit ripe)......	197.0	193	196	184	156	....	184	206	237	220	....

PHENOLOGICAL OBSERVATIONS, NOVA SCOTIA, 1901.

REGIONS 1 TO 10—WHEN FIRST SEEN.

Number.	Day of the year 1901 corresponding to the last day of each month. Jan. .... 31 July ....212 Feb .... 59 Aug. . .....243 March.... . 90 Sept ....273 April ....120 Oct. ....304 May ....151 Nov......... 334 June ....181 Dec... ....365 For Leap Year add one to each except January.	Average for N.S.	1. Yarmouth and Digby	2. Shelburne, Queens and Lunenburg	3. Annapolis and Kings	4. Hants and S. Colchester	5. Halifax and Guysboro	6. S. Cobequid, (S. Cum. and S. Col.)	7. N. St. Slope (Cum. Col., Pic. & Antig	8. Richmond and Cape Breton	9. Southeast slope to Bras d'Or	10. Northwest slope to Gulf (Inverness)
55	R. nigrum (cultivated)........	141.1	137	145	138	139	143	134	140	149	137	149
56	" (fruit ripe)......	191.5	196	200	161	194	....	....	197	....	219	....
57	Syringa vulgaris, L. (cultiv.).	155.0	150	157	148	149	159	153	153	165	160	156
58	Solanum tuberosum, L........	183.5	173	179	181	182	177	179	182	194	206	182
59	Phleum pratense, L...........	177.0	171	174	168	169	172	179	174	177	202	184
60	Trifolium repens, L...........	155.8	150	160	149	151	159	148	153	162	163	163
61	T. pratense, L................	153.5	144	156	146	150	155	149	154	164	161	156
62	Triticum vulgare, L..........	193.6	....	193	176	....	187	....	196	....	216	....
63	Avena sativa, L...............	192.6	180	190	187	....	....	....	199	....	207	....
64	Fagopyrum esculentum, L...	194.4	....	198	183	183	....	....	196	....	212	....
65a	Earliest full leafing of tree....	135.5	135	139	131	128	137	134	132	142	132	145
65b	Latest " "	157.0	161	161	154	154	154	147	154	159	157	169
66	Ploughing (first of season)....	108.7	97	110	108	110	113	108	116	110	115	101
67	Sowing " " ...	119.2	109	116	116	117	122	116	124	126	127	119
68	Potato-planting "	118.8	108	115	121	123	120	118	126	117	122	118
69	Sheep-shearing "	122.9	120	124	121	134	135	128	133	121	112	101
70	Hay-cutting "	192.1	179	184	182	185	189	191	197	203	210	201
71	Grain-cutting "	239.1	237	235	236	239	241	236	241	245	243	238
72	Potato-digging "	266.1	257	262	259	260	268	266	272	272	277	268
73a	Opening of rivers "	81.0	76	86	72	80	88	79	85	73	88	83
73b	Opening of lakes "	94.8	88	96	96	92	104	79	97	92	107	98
74a	Last snow to whiten ground..	107.9	99	102	113	110	105	108	115	103	102	113
74b	" to fly in air.........	116.0	114	114	124	113	121	120	121	108	115	110
75a	Last spring frost—hard......	129.0	114	117	126	129	120	162	128	121	139	134
75b	" " hoar......	153.4	142	145	150	167	159	....	154	154	156	....
76a	Water in streams—high......	97.4	....	97	96	93	96	94	91	....	115	....
76b	" " low.......	217.0	176	250	225	....	212	242	199	....	215	....

PHENOLOGICAL OBSERVATIONS, NOVA SCOTIA, 1901.

REGIONS 1 TO 10—WHEN BECOMING COMMON.

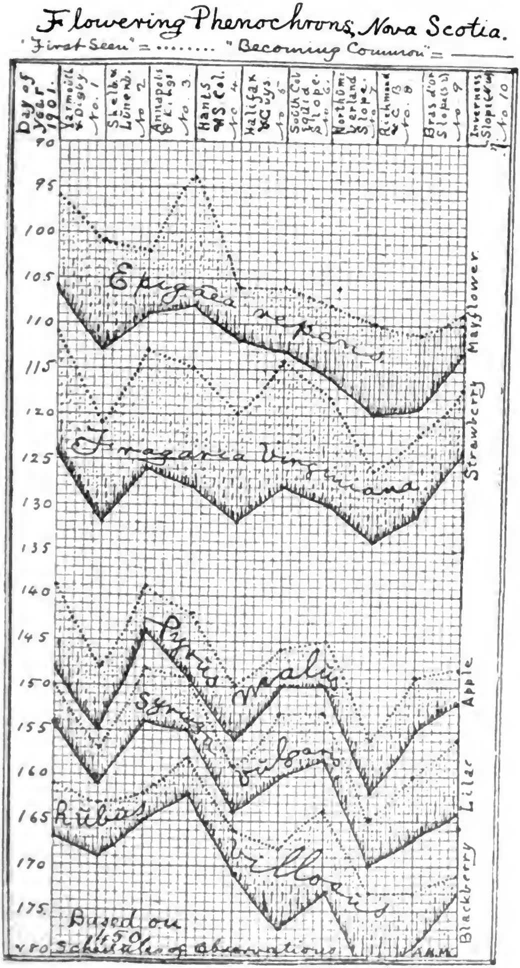
Number	Day of the year 1901 corresponding to the last day of each month. Jan. .... 31 July .... 212 Feb. .... 59 Aug. .... 243 March .... 90 Sept. .... 273 April .... 120 Oct. .... 304 May .... 151 Nov. .... 334 June .... 181 Dec .... 365 For Leap Year add one to each except January.	Average for N.S.	1. Yarmouth and Digby	2. Shelburne, Queens and Lunenburg	3. Annapolis and Kings	4. Hants and S. Colchester	5. Halifax and Guysboro	6. S. Cobequid, (S. Cum. and S. Col.)	7. N. St. Slope (Cum. Col., Pic. & Antig	8. Richmond and Cape Breton	9. Southeast slope to Bras d'Or	10. Northwest slope to Gulf (Inverness)
55	R. nigrum (cultivated)........	147.0	145	151	143	142	150	143	145	155	144	152
56	" (fruit ripe).......	216 3	218	223	214	204	....	....	211	...	228	....
57	Syringa vul., L. (cultivated)..	160.7	154	161	154	155	164	160	158	170	167	164
58	Solanum tuberosum, L.......	191.5	179	185	180	215	183	186	193	197	213	184
59	Phleum pratense, L....	181.1	178	179	176	172	168	182	179	181	206	190
60	Trifolium repens, L....... ...	164.3	162	168	158	162	167	158	162	169	169	168
61	T. pratense, L	162.3	156	164	157	156	164	163	162	170	169	162
62	Triticum vulgare, L..	194.8	....	198	180	158	....	....	209	....	229	....
63	Avena sativa, L.	209.7	....	202	....	....	....	....	212	....	215	...
64	Fagopyrum esculen., L.......	218.8	....	221	193	....	....	....	211	....	210	....
65a	Earliest full leafing of tree..	......	....	....	....	....	....	....	....	....	...	....
65b	Latest " " ...	......	....	....	....	....	....	....	....	....	....	....
66	Ploughing (first of season)....	118.8	109	121	119	....	....	114	127	124	126	110
67	Sowing " "	129.1	121	127	126	....	....	124	135	137	134	129
68	Potato-planting "	129.6	118	128	136	....	....	140	138	126	131	120
69	Sheep-shearing "	131.3	133	133	135	....	....	133	143	135	121	117
70	Hay-cutting "	202 6	185	188	188	....	....	213	207	211	215	214
71	Grain-cutting "	249.9	244	247	247	....	....	244	252	258	257	250
72	Potato-digging " ...	276.9	251	273	269	...	....	288	281	281	283	289

PHENOLOGICAL OBSERVATIONS, NOVA SCOTIA, 1901.

REGIONS 1 TO 10—WHEN FIRST SEEN.

Number.	Day of the year 1900 corresponding to the last day of each month. Jan .... 31 July ....212 Feb .... 59 Aug ....243 March .... 90 Sept .... 273 April..........120 Oct. ....304 May ....151 Nov. .... 334 June ....181 Dec. ....365 For Leap Year add one to each except January.	Average for N.S.	1. Yarmouth and Digby	2. Shelburne, Queens and Lunenburg	3. Annapolis and Kings	4. Hants and S. Colchester	5. Halifax and Guysboro	6. S. Cobequid, (S. Cum. and S. Col.)	7. N. St. Slope (Cum. Col., Pic. & Antig	8. Richmond and Cape Breton	9. Southeast slope to Bras d'Or	10. Northwest slope to Gulf (Inverness)
77a	First autumn frost, hoar......	256.4	263	262	270	252	264	254	258	261	225	255
77b	" " hard......	286.2	288	286	291	277	290	291	290	300	230	319
78a	First snow to fly in air........	294.0	293	292	290	297	293	290	292	304	297	292
78b	" whiten ground....	306.4	310	307	307	315	312	296	302	321	300	294
79a	Closing of Lakes........	343.8	349	343	342	340	347	....	337	339	353	....
79b	" Rivers............	350.0	355	353	350	348	344	....	345	354	351	....
81a	Wild ducks migrating, N.....	83.9	77	91	93	73	92	76	85	70	107	75
81b	" " " S.....	313.9	312	310	305	324	....	310	322	314	....	....
82a	" geese " N.....	83.1	79	81	86	85	84	79	82	82	90	83
82b	" " " S.....	325.7	319	327	327	345	....	323	331	308	....	....
83	Melospzia fasciata, North.....	92.9	86	90	91	88	91	97	90	99	106	....
84	Turdus migratorius "	84.0	77	85	83	78	82	83	88	89	91	....
85	Junco hiemalis "	84.5	61	110	87	88	101	....	80	....	....	....
86	Actitis macularia "	134.6	112	134	152	138	136	137	133	....	....	....
87	Sturnella magna " ...	117.4	106	110	108	....	....	128	135	....	....	....
88	Ceryle Alcyon "	130.1	131	125	136	128	134	130	127	130	....	....
89	Dendrœca coronata "	134.4	130	134	134	131	155	....	146	111	....	....
90	D. æstiva "	136.0	139	141	142	126	129	....	140	135	....	....
91	Zonotrichia alba "	127.0	140	111	123	118	151	....	110	136	....	....
92	Trochilus colubris "	146.3	154	146	145	148	144	142	147	140	151	....
93	Tyrannus Carolinensis"	135.7	139	142	137	139	....	120	137	...	....	....
94	Dolychonyx oryzivorus"	126.0	130	116	113	132	....	....	139	....	....	....
95	Spinis tristis "	139.4	151	137	141	137	141	119	150	....	....	....
96	Setophaga ruticilla "	139.4	123	147	136	145	....	....	144	....	....	....
97	Ampelis cedrorum "	148.8	172	173	143	139	....	....	117	....	....	....
98	Chordeiles Viginianus "	133.3	142	141	126	112	....	129	150	....	....	....
99	First piping of frogs..	100.8	93	99	100	102	103	102	101	104	108	97
100	First appearance, snakes.....	109.2	101	104	113	107	108	108	111	113	119	108

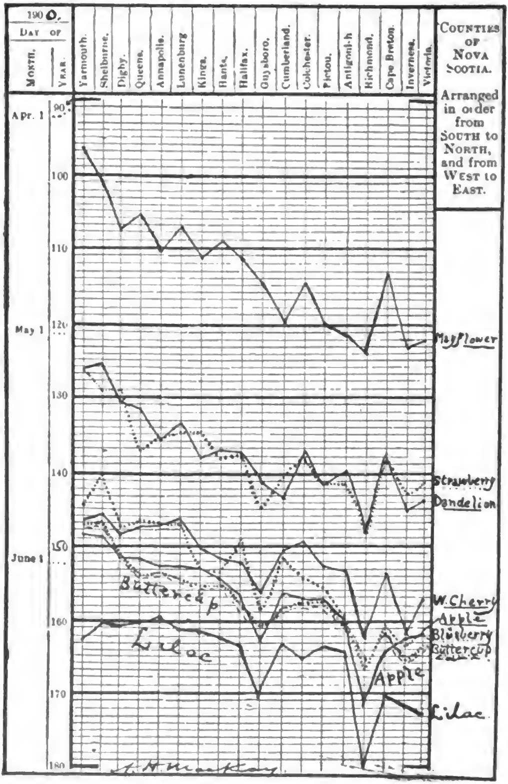
PHENOLOGICAL OBSERVATIONS, NOVA SCOTIA, 1901.



PHENOLOGICAL OBSERVATIONS, NOVA SCOTIA, 1900.

PHENOCHRON CURVES OF FLOWERING.

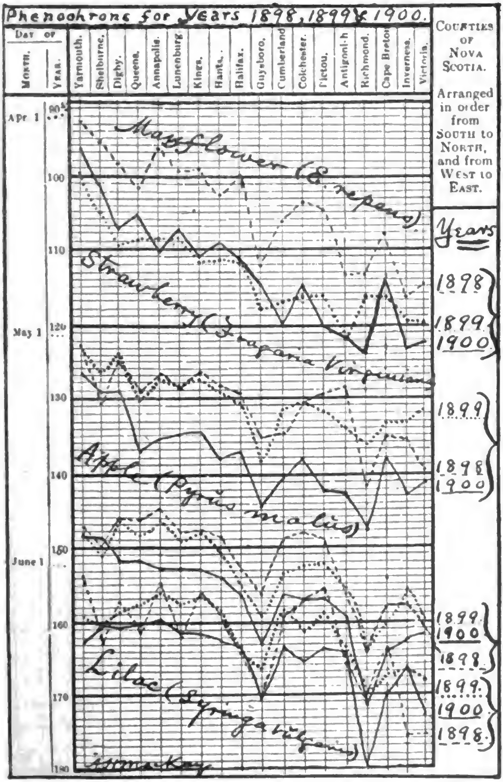
(Mean of "*first* seen" and "*becoming* common").



PHENOLOGICAL OBSERVATIONS, NOVA SCOTIA, 1898 to 1900.

PHENOCHRON CURVES OF FLOWERING.

(Mean of "*first* seen" and "*becoming* common").



PHENOLOGICAL OBSERVATIONS, CANADA, 1901.

WHEN FIRST SEEN.

Number	Day of the year 1901 corresponding to the last day of each month. Jan........ 31 July ....212 Feb......... 59 Aug.........243 March ..... 90 Sept........273 April ......120 Oct.........304 May ....151 Nov.........334 June ....181 Dec. ....365 For Leap Year add one to each except January.	Average Dates for Nova Scotia*	St. Stephen, N B.	Charlottetown, P.E.I.	(1) Richmond, Q.	(2) Richmond, Q.	Nicolet, Q.	(1 Ottawa, O.	2) Ottawa, O.	Muskoka, O.	Macgregor, Man.	Pheasant Forks, Assa.	Willoughby, Sask.	Waghorn, Alta.	Vancouver, B. C.
1	Alnus incana, Willd	104	104	113	....	..	109	108	109	107	....	.	....	...	64 *a*
2	Populus tremuloides, Michx....	109	....	113	....	...	....	108	108	113	....	....	....	118	......
3	Epigæa repens, L.......	104	...	110	141	....	110	108	....	....	....	....	....	....	......
4	Viola cucullata, Gray	121	....	....	147	142	111	....	..	123	.	135	....	....	......
5	V. blanda, Willd...............	117	126	....	151	153	111	....	..	123	....	139	....	....	.. ..
6	Acer rubrum, L......	118	....	118	....	...	124	113	106	116	....	....	....	...	98 *b*
7	Houstonia cærulea, L	134	140		149	..	...		....	....	....	...	...	..	......
8	Equisetum arvense, L..........	126	145	..	..	..	...	107	....	138	..	..	...	....	79
9	Taraxacum officinale, Weber ..	123	126	132	154	...	123	114	118	121	...	143	...	....	89
10	Erythronium Amer., Ker........	130	...	....	144	139	118	116	114	118	....		....	..	......
11	Hepatica triloba, Chaix	129	122	..	140	125	111	105	104	....	....	..	....	169	......
12	Coptis trifolia, Salisb...........	128	147	..	....	....	–	...	124	132	....	....	..	....	......
13	Fragaria Virginiana, Mill.......	117	132	135	141	...	112	121	99	132		139	....	137	......
14	" (fruit ripe)..	154	167	....	191	....	154		164	182	161	...	...	..	146
15	Prunus Pennsyl., L.....	139	....	....	162	....	127	141	128	132	...	142	...	138	120 *c*
16	" (fruit ripe)..	204	..	....	....	...	....	....	....	...	....		....	201	......
17	Vaccinium Penn., Lam.	138	147	...	..	.		....	121	....	.	..	...		61 *d*
18	" (fruit ripe). .	196	..	....	....	....	....	....	...	203	....	....	....	....	......
19	Ranunculus acris, L	144	161	....	172	170	147	144	143	169	....	....	....	147	......
20	R. repens, L....................	149	...	....	....	....	150	....	..	...	....	116	...	..	143
21	Clintonia borealis, Raf..........	146	....	....	141	....	157	149	143	....	....	....	....	..	.....
22	Trillium erythrocarpum, Michx	140	...	....	144	140	119	129	...	....	....	....	....	..	......
23	Trientalis Ameri., Pursh	141	....	..	..	..	..	..	143	....	....	..	....	....	......
24	Cypripedium acaule, Ait........	152	160		....	....	151	....	....	....	..	...	....	169	......
25	Calla palustris, L.....	151	....	....	...	...	163	117	..	148	....	....	....	....	......
26	Amelanchier Canadensis, T.& G.	137	143	..	....	....	....	125	128	123	..	138	..	136	132
27	" (fruit ripe)	190	....	....	..	....	....	....	....	...	....	....	..	198	.....
28	Rubus strigosus, Michx.........	156		....	...	..	149	..	151	...	....	....	....	190	146 *e*
29	" (fruit ripe)...	193	...	....	....	....	...		....	..	...	....	....	201	......
30	Rubus villosus, Ait......	165	....	...	...	..	152	...	...	..	....	....	....	....	......
31	" (fruit ripe)...	325	...	....	....	...		....	....	235	....	...	....	....	.

a **Alnus rubra.** *b* **Acer macrophyllum.**

c **Prunus emarginata.**

d **Vaccinium myrtilloides.**

e **Rubus occidentalis.**

*** These phenochrons are derived from about 450 schedules representing every county of the province, and the fractions are omitted for compactness.**

PHENOLOGICAL OBSERVATIONS, CANADA, 1901.

WHEN FIRST SEEN.

Number	Day of the year 1901 corresponding to the last day of each month. Jan. .... 31 July ....212 Feb .... 59 Aug . ....243 March....... 90 Sept..'......273 April...... .120 Oct .... 304 May.........151 Nov......... 334 June ....181 Dec .... 365 For Leap Year add one to each except January.	Average dates for * Nova Scotia.	St. Stephen, N.B.	Charlottetown, P.E.I.	(1) Richmond, Q.	(2) Richmond, Q.	Nicolet, Q.	(1) Ottawa, O.	(2) Ottawa, O.	Muskoka, O.	Macgregor, Man.	Pheasant Forks, Assa.	Willoughby, Sask.	Waghorn, Alta.	Vancouver, B.C.
32	Kalmia glauca, Ait	149	162	....	....	....	...	...	....	...	....	...	...	....	121
33	K. angustifolia, L..............	159	...	...	...	...	....	...	....	...	....	....	....	...	.....
34	Cornus Canadensis, L...........	142	....	...	...	...	....	...	147	..	....	..	153	....	134
35	" (fruit ripe)....	190	...	....	....	....	...	...	...	238	...	....	...	....	......
36	Sisyrinchium angustifolium ..	155	....	....	177	181	153	....	151	....	..	....	..	137	......
37	Linnæa borealis, L.........	169	167	....	..	....	...	....	170	....	....	...	....	.	.....
38	Linaria Canaden., Dum.........	173	...	....	147	...	173	....	...	...	...	...	...	..	......
39	Rhinanthus Crista-galli, L	168	....	...	..	....	...	....	....	....	..	....	...	...	.....
40	Sarracenia purpurea, L.........	166	....	...	....	...	....	....	....	..	...	....	....	..	.....
41	Brunella vulgaris, L............	160	....	...	..	....	....	...	...	182	..	..	....	....	......
42	Epilobium augustifolium, L....	178	....	....	...	...	...	..	....	190	..	....	....	192	171
43	Rosa lucida, Ehrh.............	177	189	....	189	...	152	....	164	193	....	....	...	166	148 *f*
44	Hypericum perforatum, L.....	168	...	....	....	....	..	...	...	191	....	....	....	...	.....
45	Leontodon autumnale, L.	168	.....	...	....	...	....	...	...	260	....	...	..	...	......
46	Prunus Cerasus (cultiv.)........	148	147	...	....	143	128	132	...	....	...	.	...	..	107
47	" (fruit ripe) ...	189	...	..	...	...	..	...	...	...	...	..	...	....	167
48	Cratægus Oxyacantha, L.	153	...	..	..	..	...	..	...	....	...	...	...	..	......
49	C. coccinea, L...................	153	.....	153	160	....	...	143	145	146	....	142	..	....	......
50	Prunus domestica (cult'd.).....	144	..	...	107	....	129	...	124	129	...	141	...	....	104
51	Pyrus malus (cult'd) early.....	146	147	139	140	...	137	140	138	..	..	.	...	....	117
52	" " late........	155	....	...	....	..	....	...	..	...	...	....	....	....	......
53	Ribes rubrum (cultivated)......	138	144	..	...	143	14	....	..	129	....	141	..	....	.....
54	" (fruit ripe) ...	187	....	..	...	..	..	..	..	..	...	....	....	..	.....
55	R. nigrum (cultivated)..........	141	...	....	...	...	145	...	136	133	...	139	....	...	......
56	" (fruit ripe)...	194	....	..	..	....	...	...	..	....	...	...	..	...	.....
57	Syringa vulgaris, L. (cultiv.)...	165	....	153	150	..	140	...	139	140	...	..	..	..	127
58	Solanum tuberosum, L	183	...	....	...	....	161	..	...	198	...	...	..	207	160
59	Phleum pratense, L.............	177	....	...	..	....	152	...	129	19	..	...	..	205	.....
60	Trifolium repens, L...........	155	....	....	171	....	149	....	133	...	.	....	.	190	130
61	T. pratense, L..................	153	....	...	178	185	144	....	.	.	..	...	...	....	141

---

f Rosa Nutkana.

* These phenochrons are derived from about 450 schedules representing every county of the province. Each has a fraction which is omitted here for the sake of compactness.

PHENOLOGICAL OBSERVATIONS, CANADA, 1901.

WHEN FIRST SEEN.

Number	Day of the year 1901 corresponding to the last day of each month. Jan. .... 31 July . ....212 Feb. .... 59 Aug....... 243 March .... 90 Sept.........273 April.......120 Oct ....304 May. ....151 Nov.........334 June........181 Dec .. .. 365 For Leap Year add one to each except January.	Average dates for Nova Scotia.*	St. Stephen, N.B.	Charlottetown, P.E.I.	(1, Richmond, Q.	(2) Richmond, Q.	Nicolet, Q.	(1) Ottawa, O.	(2) Ottawa, O.	Muskoka, O.	Macgregor, Man.	Pheasant Forks, Assa.	Willoughby, Sask.	Waghorn, Alta.	Vancouver, B.C.
62	Triticum vulgare, L.	198	...	...	...	...	...	...	..	...	...	...	...	202	.....
63	Avena sativa, L	192	...	..	...	..	...	...	..	..	.	..	...	206	.....
64	Fagopyrum esculentum, L.......	194	..	...	...	..	..	...	...	...	...	...	...	...	.....
65a	Earliest full leafing of tree	135	...	...	...	...	..	...	...	...	..	...	129	..	.....
65b	Latest " "	157	..	..	...	...	...	...	..	..	...	...	...	...	.....
66	Ploughing (first of season)......	108	..	...	130	...	118	...	..	...	99	119	115	105	.....
67	Sowing " "	119	...	108	...	...	123	.	...	..	..	133	116	102	....
68	Potato-planting "	118	...	...	...	..	121	121	...	...	...	134	137	110	.....
69	Sheep-shearing "	122	...	...	181	...	121	114	...	..	...	153	158	147	.....
70	Hay-cutting "	192	...	..	...	...	..	...	...	...	...	217	..	193	.....
71	Grain-cutting "	239	...	213	...	..	...	...	...	..	..	215	...	...	.....
72	Potato-digging "	266	..	...	...	...	...	...	.	...	...	263	205	191	.....
73a	Opening of rivers "	81	...	97	127	..	...	.	...	...	93	106	...	83	.....
73b	Opening of lakes "	94	...	..	...	...	..	...	..	..	99	...	..	120	.....
74a	Last snow to whiten ground ...	107	..	.	129	159	121	110	110	111	89	166	155	155	.....
74b	" to fly in air..........	116	...	...	...	179	...	...	...	111	117	...	..	156	.....
75a	Last spring frost—hard.	129	130	...	...	191	126	...	.	...	...	132	...	156	.....
75b	" " hoar........	153	145	..	..	...	...	...	..	...	126	...	151	156	128
76a	Water in streams—high	97	...	...	...	...	...	..	...	...	94	111	..	117	.....
76b	" " low.......	217	...	...	..	..	...	..	...	...	...	144	...	330	.....
77a	First autumn frost—hoar..	256	...	270	...	...	...	...	...	277	...	...	...	223	.....
77b	" " hard........	286	..	...	...	356	...	...	...	286	..	.	...	307	.....
78a	First snow to fly in air..........	294	...	...	...	...	...	314	...	276	...	...	...	248	.....
78b	" whiten ground.....	306	...	...	..	...	313	...	314	276	...	...	259	248	.....
79a	Closing of lakes, ...	343	...	...	.	...	.	...	...	...	...	...	..	...	.....
79b	" rivers	350	...	5	...	...	...	...	...	...	...	..	...	...	.....
81a	Wild ducks migrating, N..	84	...	...	126	103	..	...	103	...	...	96	...	84	.....
81b	" " S	313	...	...	...	...	...	...	..	..	...	...	...	...	.....
82a	" geese " N.	83	..	77	125	118	...	.	112	114	...	85	..	83	.....
82b	" " S	325	...	244	...	..	...	...	..	...	...	...	...	245	.....
83	Melospiza fasciata, North.......	92	...	104	..	...	...	86	82	...	...	108	...	...	.....

* These phenochrons are derived from about 450 schedules representing every county in the province. Each has a fraction which is omitted here for the sake of compactness.

PHENOLOGICAL OBSERVATIONS, CANADA, 1901.

WHEN FIRST SEEN.

Number	Day of the year 1901 corresponding to the last day of each month. Jan....... 31 July.......212 Feb......... 59 Aug.........243 March....... 90 Sept.........273 April.......120 Oct..........304 May..........151 Nov.........334 June.........181 Dec.........365 For Leap Year add one to each except January.	Average dates for Nova Scotia.*	St. Stephen, N.B.	Charlottetown, P.E.I.	(1) Richmond, Q.	(2) Richmond, Q.	Nicolet, Q.	(1) Ottawa, O.	(2 Ottawa, O.	Muskoka, O.	Macgregor, Man.	Pheasant Forks, Assa.	Willoughby, Sask.	Waghorn, Alta.	Vancouver, B.C.
84	Turdus migratorius, North	84	...	99	108	100	..	88	81	....	...	99	...	88	.....
85	Junco hiemalis "	84	....	105	. ..	....	....	92	87	116	....	99	...	...	....
86	Actitis macularia "	134	....	....	....	..	...	....	124	..	..	....	....	..	....
87	Sturnella magna "	117	....	....	....	....	....	127	95	....	....	100	....	...	....
88	Ceryle Alcyon "	130	....	....	....	..	....	....	103	..	....	...	. .	..	.....
89	Dendrœca coronata "	134	...	...	....	...	....	...	130	..	....	....	....	....	....
90	D. æstiva "	136	....	....	....	124	121	135	129	..	....	...	....	....	.....
91	Zonotrichia alba "	127	126	....	..	....	..	94	105	....	...	....	..	..	.....
92	Trochilus colubris "	146	....	....	171	115	....	128	141	138	...	..	....	...	.....
93	Tyrannus Carolinensis "	135	....	....	....	..	....	....	131	...	....	....	...	...	....
94	Dolychonyx oryzivorus, North..	126	...	....	144	161	138	127	136	....	....	....	..	...	.....
95	Spinis tristis "	139	....	....	..	...	...	....	116	.	118	..	..	...	.....
96	Setophaga ruticilla "	139	....	....	...	...	...	...	136	....	....	....	....	..	.....
97	Ampelis cedrorum "	148	....	...	....	...	....	48	...	...	..	...	....	...	....
98	Chordeiles Viginianus "	133	....	152	...	..	...	135	141	162	..	145	..	....	.....
99	First piping of frogs	100	....	99	141	118	116	....	100	101	94	112	....	108	59
100	First appearance of snakes......	109	132	....	161	118	118		103	103	96	114	111	121	......

* These phenochrons are derived from about 450 schedules representing every county of the province. **Each has a fraction which is omitted here for the sake of compactness.**

SOCIÉTÉ ROYALE DU CANADA

MÉMOIRES

SECTION I.

LITTÉRATURE FRANÇAISE, HISTOIRE, ARCHÉOLOGIE, ETC.

ANNÉE 1902

I.—*Historique de la Bibliothèque du Parlement à Québec, 1792-1892.*

Par N.-E. DIONNE, M.D., LL.D.

Bibliothécaire de la Législature de la Province de Québec.

(Lu le 27 mai 1902.)

La fondation d'une bibliothèque spécialement consacrée à l'usage des députés du peuple canadien, remonte aussi loin que l'introduction du régime parlementaire dans la province de Québec. La rareté des livres à cette époque déjà assez reculée (1791-92), explique facilement les humbles débuts d'une telle fondation. Joignons à cela la nouveauté du régime, le manque de culture intellectuelle chez la masse du peuple, et malheureusement aussi au sein de la Législature, et nous comprendrons aisément que le goût de la lecture n'était guère répandu, et parmi ceux-là qui se targuaient d'être un tant soit peu lettrés, la plupart se contentaient des quelques ouvrages français échoués par hasard sur nos rivages. Ces ouvrages, avouons-le, n'étaient pas toujours bons; plus d'un Voltaire ou d'un Jean-Jacques s'étaient glissés dans des bibliothèques privées, à côté des *Mille et une nuits* ou des *Mille et un jours*, dont la vogue ne diminuait pas.

L'Assemblée Législative ne connut pas dans le principe de bibliothécaires en titre. Ce fut d'abord le Greffier de la Chambre qui fut chargé de la besogne, et ce système dura quarante ans. Ce furent Samuel Philipp, de 1792 à 1802, et William Lindsay, de 1802 à 1833. Le greffier-bibliothécaire faisait les achats de livres, il en contrôlait les prêts et les remises, et chaque année, à partir de 1802, suivant un ordre de la Chambre en date du 10 mars, il faisait un rapport de sa gestion en des termes toujours laconiques ; ce rapport comprenait la liste détaillée des ouvrages achetés durant la vacance parlementaire, et le prix de revient de ses acquisitions. C'est grâce à ces rapports que nous avons pu constater qu'en 1817 la bibliothèque renfermait 1,000 volumes, et 4,921 en 1832. Il avait fallu quarante ans pour recueillir ce petit trésor de livres, car, pour l'époque, c'était réellement un trésor, où il se rencontrait quelques volumes imprimés à Québec et à Montréal, mais ils étaient précieux parce qu'ils représentaient les premiers-nés de l'imprimerie canadienne.

En 1833, M. Etienne Parent, traducteur français de la Chambre et officier en loi, reçut la nomination de bibliothécaire, tout en conservant ses autres fonctions de traducteur français et de greffier en loi. Il recevait $800 pour vaquer à tout. Quelque modeste que fût le salaire, il remplit sa nouvelle fonction avec le sérieux et le savoir-faire qu'il mettait à tout ce qu'il entreprenait. Avocat et ancien journaliste,—il avait rédigé le *Canadien* depuis 1822 jusqu'à 1825—, M. Parent pouvait porter fièrement le titre de bibliothécaire ; c'était un homme instruit et judicieux.

Le premier rapport officiel de M. Parent date du 7 janvier 1834. Il constate avec chagrin la disparition de plusieurs volumes au milieu de séries importantes; il demande à la Chambre de décider une fois pour toutes s'il est à propos de laisser emporter des livres par les députés, en violation du règlement; il recommande l'achat d'un certain nombre d'ouvrages dont le besoin est impérieux.

Dans son rapport du 27 octobre 1835, M. Parent annonce qu'il a dressé un nouveau catalogue, celui de 1831 étant devenu insuffisant. La classification toutefois est restée la même. Il recommande de tenir la bibliothèque ouverte jusqu'à la brunante, afin de favoriser ceux qui, à raison de leurs occupations, ne peuvent fréquenter la bibliothèque qu'après la fermeture de leurs bureaux ou ateliers.

Ce fut le dernier acte officiel de M. Parent en sa qualité de bibliothécaire.[1] Son salaire étant resté le même, malgré l'augmentation de besogne, il se démit, en 1835, et son successeur M. Jasper Brewer trouva, en prenant charge de la bibliothèque, environ 5,500 volumes, comme l'indique un catalogue imprimé à cette époque par ordre de la Chambre.

M. Brewer était un Allemand catholique, natif de Cologne. Il remplissait depuis 1818 les fonctions de greffier des comités. Lors de la guerre de 1812 il avait servi en qualité de lieutenant dans la milice canadienne, dans le régiment des Meurons. Est-ce à ses états de service comme militaire ou à ses qualités spéciales comme littérateur qu'il dut son entrée dans le service civil? C'est plus que nous pouvons dire, avec les quelques bribes de tradition qui nous en sont parvenues ; mais, ce qui est certain, c'est que Brewer était un brave et honnête homme, un citoyen irréprochable, et aussi un bon musicien. Bien qu'il fût d'une constitution délicate, il se montra toujours assidu à son devoir, luttant d'un pied ferme contre la maladie qui le minait lentement mais sûrement.

Après les troubles de 1837-38, lors de la création du conseil spécial, Jasper Brewer agit comme greffier du conseil exécutif, et il semble qu'on ait relégué dans l'ombre, de 1838 à 1841, et le bibliothécaire et sa bibliothèque. Brewer ne cessa pas toutefois d'être bibliothécaire, et quand il disparut du monde des fonctionnaires publics — en 1841 — la bibliothèque renfermait 7,000 volumes. En reconnaissance de ses services, la Chambre lui alloua une pension viagère de £120. Brewer quitta Québec pour aller vivre à Saint-Hyacinthe, où il mourut le 19 mai 1846. Le *Canadien,* annonçant cette nouvelle, disait: " Tous ses actes furent marqués au coin de l'honneur et de la probité la plus exquise. Sa foi fut celle d'un bon chrétien et d'un fervent catholique."

---

[1] M. Parent était né à Beauport, le 2 mai 1801. Ses études collégiales terminées, il entra, à 21 ans, à la rédaction du *Canadien*. Après la suspension de ce journal en 1825, il se livra à l'étude du droit et se fit admettre au barreau. Puis il accepta la fonction de traducteur français et de greffier en loi. Plus tard il reprit la direction du *Canadien* qu'il conserva jusqu'en 1842. Il fut alors nommé greffier du conseil exécutif. En 1847 il devint assistant secrétaire provincial et en 1867, assistant secrétaire d'Etat, fonction qu'il remplit jusqu'à sa mort.

Avant de passer outre, jetons un coup d'œil sur le travail opéré dans la province du Haut-Canada à l'égard de la bibliothèque de la Législature. D'après un rapport de M. Fothergill en date du 10 février 1827, nous constatons que cette bibliothèque ne fut réellement fondée qu'en 1815. Avant cela, ce n'était qu'un simulacre de bibliothèque, et conséquemment pas de bibliothécaire. Ce ne fut qu'en 1827 que M. Robert Sullivan fut nommé pour prendre soin des livres avec un salaire de £50. Cet humble fonctionnaire, qui, plus tard, devait être juge dans sa province, resta bibliothécaire jusqu'en 1835, alors qu'il fut nommé au conseil législatif, et ce fut M. Alpheus Todd qui le remplaça, en attendant qu'on lui choisît un successeur. Ce fut cette année-là que la Législature du Haut-Canada accorda une appropriation de $500 pour l'achat de livres. La bibliothèque renfermait alors 600 volumes, bien qu'un catalogue, imprimé en 1830, en donne une liste de mille.

En 1836, le Dr William Winder fut nommé à la place de Sullivan, et Todd lui fut adjoint en qualité d'assistant. Winder avait été admis à pratiquer la médecine le 29 septembre 1835. Il est loisible de croire qu'il préférait les livres aux malades, puisqu'après quelques mois de pratique seulement, il crut bien faire en se laissant caser.

Quant à Todd, c'était encore un tout jeune homme, presque un enfant, mais rempli des plus belles espérances d'avenir. Méthodique, studieux, intelligent, il ne devait pas tarder à prendre le premier rang dans cette bibliothèque, où, plus que tout autre, il se trouvait chez lui.[1]

En 1841, l'union des provinces du Haut et du Bas Canada étant passée dans le domaine des faits accomplis, on dut aussi opérer l'union des deux bibliothèques. A Québec, Brewer disparu, les chefs politiques s'entendirent pour mettre à la tête de la bibliothèque du Canada-uni les deux fonctionnaires qui, depuis 1836, relevaient du gouvernement de la province du Haut-Canada. Voilà pourquoi nous retrouvons à Québec, en 1841, Winder et Todd, le premier bibliothécaire en chef, le second son assistant.

---

[1] Todd était né en Angleterre le 30 juillet 1821. Il vint au Canada à l'âge de douze ans. En 1839 il publia un ouvrage intitulé : " The Practice and Privileges of the two Houses of Parliament ", ouvrage resté célèbre, ainsi que le suivant qui fait encore autorité sur les questions constitutionnelles: " On Parliamentary Government in England ", paru en 1867.

On se rappelle que, durant la période de l'Union, le parlement tenait ses assises alternativement dans les quatre principales villes du Canada, qui étaient Québec, Montréal, Toronto et Kingston. Les députés étaient obligés, au grand désespoir de plusieurs, d'émigrer à chaque parlement d'une ville à l'autre, ayant parfois à franchir des distances considérables sans autre moyen de transport que la carriole ou la légendaire calèche. Comme la bibliothèque était une et ne pouvait être fractionnée en quatre sections, il fallut bon gré mal gré soumettre les livres au régime de l'émigration, et, tous les quatre ans, les encaisser pour les diriger vers la capitale provisoire. On voit d'ici le sort de cette bibliothèque ambulante, exposée aux nombreuses vicissitudes des emballages, des transports par voie fluviale, des déballages, etc., etc. En 1849 nous la retrouvons à Montréal, après avoir fait un séjour de quatre ans à Kingston. Elle se composait de 8,232 volumes, mais il y en avait d'autres à Québec, environ 4,000, que l'on n'avait pas jugé à propos de transporter, les jugeant d'aucune utilité pour le législateur.

La bibliothèque s'était donc enrichie de 5,232 volumes depuis l'entrée en fonction du D^r^ Winder et de son assistant. En 1842 et en 1846 on avait fait imprimer des catalogues de consultation facile. Elle commençait à prendre d'assez jolies proportions cette bibliothèque, vieille de plus de cinquante ans, presque sexagénaire. Elle renfermait des volumes précieux au point de vue de l'histoire du Canada, entre autres le Journal des Campagnes de 1759, rédigé par Knox, et 47 almanachs de Nelson.

Le 25 avril, au cours d'une émeute survenue à Montréal à propos de l'adoption par la Chambre d'Assemblée d'un bill d'indemnité en faveur des exilés de 1837, le feu se déclara aux édifices parlementaires et les consuma avec les livres de la bibliothèque. La perte fut presque complète. Un nommé James Curran parvint à sauver seul plus de deux cents volumes, parmi lesquels se trouvait la collection des journaux de l'Assemblée Législative du Haut-Canada depuis 1825 jusqu'à l'Union. La collection d'ouvrages sur l'Amérique recueillis par Faribault, au nombre de 2,000 volumes, et dont on peut se faire une idée juste par le catalogue qu'il en a publié, fut entièrement consumée. Cet incendie fut véritablement désastreux, car il fallut commencer en neuf la partie concernant le droit parlementaire, le droit civil, la série des documents officiels qui, pour la députation, valait mieux que tout le reste.

Les 8,000 volumes composant la bibliothèque du conseil législatif furent également la proie des flammes.

Afin de donner une idée plus juste de l'importance du trésor que l'on possédait, parcourons le tableau suivant dressé par catégories de matières:

1.	Théologie, Religion et Histoire ecclésiastique	275 v.
2.	Gouvernement, Politique et Législation	430 v.
3.	Economie politique, Commerce et Statistiques	195 v.
4.	Droit naturel, Droit civil et canonique	175 v.
5.	Droit constitutionnel, parlementaire, etc.	1,025 v.
6.	Statuts, Traités et Rapports	770 v.
7.	Lois des Colonies	450 v.
8.	Lois françaises, Traités, Commentaires	910 v.
9.	Sciences physiques, mathématiques	695 v.
10.	Histoire naturelle, Agriculture, Botanique, Arts mécaniques et Manufactures	750 v.
11.	Belles-Lettres, Classiques	460 v.
12.	Littérature en général	875 v.
13.	Géographie, Voyages	415 v.
14.	Histoire générale	515 v.
15.	Histoire de l'Europe, Romaine	455 v.
16	Histoire de France, Mémoires	760 v.
17.	Histoire d'Angleterre, d'Ecosse	710 v.
18.	Autres classes	1,355 v.
19.	Additions depuis 1847	1,000 v.
20.	Collection sur l'Histoire d'Amérique	1,592 v.
	Total	13,902 v.

Il y avait près de vingt ans que M. Faribault travaillait à recueillir les ouvrages les plus sérieux sur l'histoire de l'Amérique et du Canada. On conçoit tout ce que cet infatigable travailleur dut mettre de patience et de persévérance pour parvenir à collectionner seize cents volumes portant la rubrique *Americana*. Pour ne citer que les ouvrages relatifs à l'histoire du Canada, M. Faribault avait réussi à se procurer les éditions originales de Champlain, de Sagard, de Lescarbot, du P. du Creux, du P. C. Leclerq, de LaHontan, de Hennepin, de Denys, de La Potherie, de Lafitau, de Charlevoix, et combien d'autres moins anciennes, mais dont la valeur historique s'impose, comme *Knox's History; Mante's History of the War in America ; Douglass' British Settlements in America; Jeffery's History of British Dominions in America; Walker's Expedition to Canada,* 1720 ; *Bollan's Importance of Cape Breton,* 1746.

Tant de richesses, amassées au prix des plus pénibles efforts, furent englouties en quelques minutes dans le brasier allumé par des incendiaires que la loi fut impuissante à atteindre. Les Communards de Paris, en 1871, respectèrent au moins la Bibliothèque Nationale et quelques dépôts d'archives.

D'autres riches collections subirent, en ce jour néfaste, le sort de la bibliothèque Faribault. Les Journaux de la Chambre des Lords et des Communes de Londres, au nombre de 182 volumes; les *Records of Great Britain*, 90 volumes; la collection d'Audubon sur l'*Ornithologie américaine*—2 exemplaires avaient coûté £500; les *Mémoires inédits sur l'Histoire de France*, 65 volumes; le *Mercure François*, 24 volumes, don du gouvernement de France, tout fut anéanti ainsi que toutes les archives de l'ancienne Législature du Haut-Canada et du Canada depuis l'Union, consistant en rapports de comités, pétitions adressées aux deux Chambres, documents nombreux sur la statistique du pays, projets de lois soumis à la Chambre depuis quinze à vingt ans, et reliés en volumes séparés.

L'on estima dans le temps que la perte pouvait être évaluée à la somme de £25,000. Quelque exagérée que puisse être cette appréciation du prix des livres, il n'en est pas moins certain qu'il fallût payer plus cher pour se procurer les mêmes ouvrages, si tant est qu'on ait pu se les procurer tous.

Ce ne fut que deux ans plus tard que la Chambre résolut de faire un achat considérable de livres. Entre temps, la bibliothèque dut se contenter de recevoir des dons, qu'elle avait sollicités, du reste, et des particuliers et des gouvernements étrangers. L'Angleterre nous fit cadeau de 1419 volumes, l'état de New-York de 60. M. Stewart Derbishire donna 52 volumes, M. Louis Guillet, M.A.L., 48, M. Caleb Hopkins, 29, et M. James Durand, 17.

Enfin, à l'automne de 1851, M. G.-B. Faribault, assistant-greffier de l'Assemblée Législative, muni d'instructions spéciales et d'un crédit de £4,400 sterling, partait pour l'Europe dans le but de faire un grand achat de livres. Sur ce gros montant, quatre cents louis devaient être consacrés à la transcription de documents historiques sur le Canada. M. Faribault quitta Québec avec son épouse, le 3 octobre. Après une courte halte à New-York, ils prirent passage sur le paquebot qui devait les déposer en Angleterre le 20 du même mois.

Dès son arrivée à Londres, M. Faribault s'aboucha avec les frères Rich, libraires les plus en vogue, qui se chargèrent de remplir ses commandes. Comme le parlement était alors en vacance, M. Faribault comprit qu'il n'obtiendrait pas facilement les faveurs qu'il espérait du gouvernement. Cependant il reçut du bureau de l'amirauté, par l'entremise de M. Francis Beaufort, une série complète des cartes et plans relatifs aux travaux hydrographiques du capitaine Bayfield sur le fleuve Saint-Laurent et les grands lacs.

Croyant qu'il serait plus heureux à Paris, M. Faribault y courut sans plus tarder. Le 10 novembre il rendait visite à M. Adolphe de Puibusque, qui avait résidé à Québec de 1848 à 1850. Ce fut une bonne fortune pour notre agent canadien que de rencontrer la protection de ce Français influent, ami dévoué du Canada. Cet homme aux idées généreuses et bien connu du tout-Paris officiel, se fit fort de lui ménager des entrevues avec les sommités gouvernementales, avec les bibliothécaires et les archivistes les plus en vue. Malheureusement, les événements du 2 décembre, et surtout la maladie sérieuse de madame Faribault, empêchèrent non-seulement les achats, mais aussi les entrevues projetées avec les chefs des différents ministères. Et pour comble d'infortune, madame Faribault, dont la santé déclinait visiblement depuis plusieurs mois, mourut à Paris vers le milieu de mars. M. Faribault lui-même tomba malade, et se trouva dans l'impossibilité d'agir. Enfin, après plusieurs semaines de réclusion, M. Faribault put s'adresser aux départements publics et aux secrétaires des académies, sollicitant leur aide. Partout l'accueil fut cordial, et bientôt il put réaliser que les promesses seraient remplies. Il reçut en pur don du bureau de la Marine et des Colonies 92 volumes, du bureau de l'Instruction publique 100, du département des Beaux-arts 80, du ministère de la Guerre 14, du président du corps législatif 295, et de l'Académie française 95. En tout 676 volumes, dont la valeur pouvait être estimée à $1,600.

M. Faribault acheta à Paris des livres au montant de £1,300 st., et en Angleterre pour £1,009 st., payés comptant. Mais il y avait d'autres déboursés à faire, entre autres pour la reliure, les commissions, les frais de transport, les transcriptions de documents à Paris, etc. De sorte que, tous comptes faits, lorsque M. Faribault fut retourné d'Europe, il restait une balance de £150 st. qui n'avait pas été dépensée.

Les acquisitions de M. Faribault ajoutées aux dons faits dans le pays et aux Etats-Unis, portèrent le chiffre des livres de la bibliothèque à 17,000. On avait acheté un magnifique mobilier pour recevoir dignement les nouveaux hôtes du parlement. Il n'y avait plus qu'à continuer régulièrement les achats, et en peu d'années la bibliothèque ferait l'honneur du pays. La ville de Québec était heureuse de posséder dans ses murs, non seulement un magnifique hôtel du parlement, admirablement situé au sommet de la côte de la montagne, mais aussi une collection de livres, de cartes, de manuscrits, telle que le Canada n'en avait jamais connue. C'était le temps de dire, ou jamais, qu'à quelque chose malheur est bon, puisqu'il avait fallu un incendie pour opérer une telle résurrection.

Tout allait donc pour le mieux dans le meilleur des mondes—celui des députés et des bibliothécaires—lorsque l'élément destructeur qui avait déjà compromis une fois le sort des livres du parlement, vint s'abattre sur l'hôtel du parlement et, en quatre heures, le 1er février 1854, en consuma tout l'intérieur, ne laissant que les murs calcinés. Du moment qu'il fut constaté que le feu était incontrôlable, on fit l'impossible pour sauver les livres. L'administrateur de la province, M. William Rowan, le commandant de la garnison Grubbe, à la tête de ses militaires, les élèves du petit séminaire, transportèrent tout ce qu'ils purent sauver dans la chapelle du palais épiscopal. Grâce à ces efforts combinés, ils arrachèrent ainsi à la destruction 9,319 volumes. Sur ce nombre il fallut plus tard en retrancher 594 inutiles, qui furent abandonnés aux compagnies d'assurance. La bibliothèque était assurée pour un montant de £10,000, et le gouvernement reçut £5,700 pour compenser sa perte.

Les livres furent transportés au séminaire, dans trois chambres que prêta généreusement M. le Supérieur. On avait pensé d'abord au couvent des Sœurs de la Charité, mais la Providence permit qu'il n'en fût rien, car l'hospice fut incendié peu de temps après le parlement. De 17,000 le nombre de volumes se trouva réduit à 9,120. C'était encore un bon noyau; l'on avait sauvé les documents officiels, les livres de droit parlementaire, enfin toute cette partie que le législateur avait le plus besoin de consulter. Mais on perdait la plupart des livres achetés en Europe par M. Faribault. La Chambre ne pouvait rester inactive en présence de ce nouveau désastre. Au cours de la session de 1854, elle acheta cent copies de dessins exécutés par M. P.-L. Morin, du département de l'arpenteur-général. C'étaient des fac-similés de mappes et de cartes pris sur des originaux déposés aux archives de Paris. Ces esquisses se rapportaient à l'histoire et à la géographie topographique du Canada. La Chambre paya £150 pour cette précieuse acquisition.

La Chambre acheta, en outre, de M. Morin cinquante copies d'un nouveau plan de la ville de Québec, et en fit la distribution dans les principaux établissements d'éducation.

Le 28 mai 1855, le gouvernement mit le Dr Winder à sa pension, en lui allouant £200 par année, et le remplaça par M. Todd. Du même coup elle nommait assistant de M. Todd, M. Gérin-Lajoie, attaché à la bibliothèque depuis 1852. Trois jours après, M. Todd partait pour l'Europe avec la mission d'acheter des livres traitant de jurisprudence, de littérature et de sciences. Un crédit de £9,621:9:6 sterling lui était ouvert. C'était une grosse somme qui, bien employée, pouvait remettre la bibliothèque à flot.

M. Todd commença par intéresser le public anglais à son œuvre de réparation. Il demanda des secours gratuits, et il en reçut, grâce à l'heureuse intervention de la reine Victoria. La Chambre des Lords donna 1,300 volumes, qui comprenaient des journaux et des documents sessionnels de 1790 à 1854. La Chambre des Communes lui fit remettre 803 volumes de documents, de 1806 à 1825, de 1844 à 1850, et de l'année 1854. M. Todd réussit à obtenir des dons importants de la Trésorerie, du bureau de l'Amirauté, de l'Ordonnance, des Rôles, du Musée de Géologie, du Ministère des Affaires Etrangères, du Musée Britannique, du Commissariat des patentes, du bureau de commerce.

Ses achats principaux furent les suivants:

The Chronicles of Great Britain and France, 55 volumes.
Hearne's Works on Early English History, 85 vol. qui coûtèrent £75.
Publications of British Historical Society, 27 vol.
English Almanacks, de 1717 à 1820, 104 vol.
Philosophical Transactions of the Royal Society, 141 vol.
Les Transactions de diverses sociétés scientifiques, 242 vol.
Philosophical Magazine, de 1797 à 1848, 133 vol.

La France lui fit cadeau de 280 volumes d'atlas et de cartes du plus grand intérêt. A Paris, M. Todd eut recours à M. Hector Bossange, libraire, au Dr Taché, au Dr T.-Sterry Hunt, et à M. de Puibusque, pour l'aider à parfaire ses achats.

M. Todd revint à Québec au commencement de janvier 1856. Il avait acheté 17,336 volumes, pour lesquels il avait payé £7,555.0.6 sterling; il restait au crédit de la bibliothèque £1,800 sterling, pour faire face aux comptes qui n'avaient pas encore été présentés.

Durant l'absence de M. Todd, la Chambre vota des remerciements à tous ceux qui avaient travaillé à sauver les livres lors de l'incendie du 1er février 1854, à Sa Majesté la Reine, aux gouvernements anglais, français et américain, aux messieurs de l'évêché et du séminaire, à tous ceux enfin qui, de près ou de loin, avaient contribué, soit par des dons, soit autrement, à reconstituer la bibliothèque sur un bon pied. Et en 1857, celle-ci renfermait 30,000 volumes en bon ordre, et judicieusement choisis. Grâce à l'incendie, le nombre de volumes se trouvait augmenté de 13,000 en trois ans. On n'eût jamais espéré un pareil résultat dans les circonstances ordinaires. Disons aussi, à sa louange, que la Chambre avait compris son devoir et qu'elle n'épargna rien pour une œuvre aussi utile que celle de mettre à la disposition du public l'aliment qui doit servir à nourrir son intelligence.

Durant la vacance M. Todd avait travaillé à la confection d'un catalogue, mais il ne l'avait pas livré à l'impression, vu qu'il attendait de nouveaux renforts d'Angleterre et des Etats-Unis. La Compagnie des Indes Orientales lui avait annoncé un envoi considérable d'ouvrages, 340 vol. ; tous les échanges des Etats-Unis n'étaient pas encore arrivés; des livres achetés à Londres et à Paris se faisaient aussi attendre. Il valait mieux temporiser, afin que ce catalogue fût complet.

Depuis la session de 1856, l'on avait construit un édifice plus spacieux, qui permit au bibliothécaire de pouvoir mieux placer les livres et rendre leur accès plus facile; auparavant ils étaient relégués dans des constructions isolées, quoique rapprochées les unes des autres. Ce fut le 27 décembre 1856 que la nouvelle pièce fut terminée, mais les livres n'y furent installés que trois semaines plus tard, à raison de l'humidité des murs.

D'après un rapport du bibliothécaire en date du 27 février 1857, le nombre de livres à cette époque pouvait être évalué à 30,000.

Les années qui suivent n'offrent rien de bien intéressant, si ce n'est l'accroissement progressif des livres, proportionnellement à un octroi annuel de $4,000, et, en outre, le vote généreux de sommes d'argent aux auteurs d'ouvrages que l'on considérait d'utilité publique. C'est ainsi que de 1857 à 1860, la bibliothèque s'enrichit de 15,000 volumes. En 1860, elle en contenait 45,000.

En 1859, la Chambre d'Assemblée chargea M. George Coventry de collectionner tous les documents se rattachant à l'histoire primitive du Haut-Canada, depuis la prise du fort Niagara, en 1759, et aussi toutes les pièces relatives aux établissements faits par les Loyaux américains dans le Canada. La Chambre accorda £100 comme entrée de jeu. M. Coventry, malgré son grand âge, se mit aussitôt à l'ouvrage, et, dès la première année, il put recueillir des détails curieux sur les premiers colons haut-canadiens; il réussit, de plus, à se procurer de la famille du lieutenant-colonel Simcoe, premier gouverneur de la province-sœur, de précieux manuscrits concernant l'administration du Haut-Canada par ce gouverneur. En 1860, les efforts de M. Coventry furent dirigés d'un autre côté; la Chambre le chargea de se procurer les documents manuscrits et imprimés sur les établissements français dans l'Ohio, jusqu'en 1759, les documents depuis cette époque jusqu'à la constitution du Haut-Canada en province séparée (1791) et les documents inédits sur la guerre avec les Etats-Unis, de 1812 à 1815. Afin d'aider M. Coventry, la Chambre lui adjoignit M. J.-P. Smith, de Sainte-Catherine, H.-C. Elle chargea aussi M. Merritt de se procurer des copies de documents sur l'histoire ancienne du Canada-Ouest, et l'envoya à Londres. On lui alloua £200 pour mener cette entreprise à bonne fin.

Au cours de la session de 1856, la Chambre décida d'envoyer aux Etats-Unis un délégué pour établir un service régulier d'échanges avec les divers Etats. Ce fut l'honorable M. P.-H. Moore, conseiller législatif, qui reçut la nomination. Il quitta Québec au mois de mai et ne revint que le 8 février de l'année suivante. Il se rendit directement à Washington, et se mit en communication avec le juge Collamer, sénateur, et le juge Chipman, du département du Secrétaire d'Etat. Le Président des Etats-Unis lui fit un accueil des plus courtois. Du coup il obtint de pouvoir échanger les documents canadiens avec les publications du Congrès. Après bien des pérégrinations, M. Moore eut un égal succès auprès des législatures de New-York, du Connecticut, de Pennsylvanie, de l'Ohio, du Maine, du Vermont, de la Virginie, du Michigan, du Massachusetts, du New-Hampshire, et enfin de la Louisiane.

Ce voyage coûta au pays £612. La Chambre dut, en outre, débourser environ £300 pour l'achat de statuts, décisions judiciaires, etc., dont elle n'avait point de copies en sa possession, pour ses nouveaux échanges.

En 1859, l'on transporta à Québec tous les livres de la bibliothèque qui se trouvaient pour une bonne partie à Toronto. Mais comme le local était insuffisant, l'on dut déposer à l'Université Laval tous les ouvrages sur l'Amérique, une série de périodiques et les documents du parlement impérial. La collection des auteurs de droit français fut placée dans le bureau des codificateurs des lois du Bas-Canada.

Entre temps, le gouvernement encourageait les auteurs en faisant un achat assez considérable de leurs livres. L'abbé Provancher, H.-J. Morgan, J.-H. Willan, le professeur Hind furent ainsi placés sur la liste des heureux.

A Ottawa, désigné pour être la capitale du Canada conféréré, l'on avait commencé la construction d'une bibliothèque. On croyait dans le temps que l'édifice pourrait contenir 200,000 volumes, et un logement pour le bibliothécaire. M. Todd insiste beaucoup dans son rapport de 1861 sur l'à-propos de retenir à proximité de la bibliothèque un homme intéressé à la conserver. Or, qui l'est plus que le bibliothécaire lui-même? Sa voix n'eut pas d'écho, car rien n'a été fait dans le sens qu'il indiquait. Quant à la capacité de la bibliothèque d'Ottawa, on sait qu'elle ne peut loger que 90,000 volumes.

Le 16 mars 1861, la bibliothèque renfermait 47,800 volumes; le 20 mars 1862, 49,800; le 13 août 1863, 52,000; le 19 février 1864, 53,300; le 8 août 1865, 55,000.

Le bibliothécaire, M. Todd, vit, en 1865, son salaire porté à $2,400; M. Lajoie, son assistant, n'en avait que $1,600.

En 1861, M. l'abbé Ferland, M. F.-X. Garneau et M. Faribault s'adressèrent à la Chambre pour faire publier une partie de la volumineuse collection de manuscrits relatifs à l'histoire des premiers temps du Canada, collection de 54 volumes in-folio transcrits d'après les originaux conservés dans les archives à Paris. La Chambre hésita devant une pareille dépense, et se contenta de montrer sa bonne volonté, en demandant aux pétitionnaires de s'assurer, avant d'aller plus loin, si la collection était complète.

Ce fut en 1865 que l'on commença le grand et suprême déménagement de la bibliothèque de Québec à Ottawa. La mise en caisse dura du 28 septembre au 26 octobre. On se servit de barges pour le transport. Le déballage commença le 5 février suivant, et l'installation ne fut à peu près complète qu'à l'ouverture du parlement, vers le commencement de juin 1866.

Il ne restait plus à Québec que les ouvrages de droit français, qui ne tardèrent pas à prendre le chemin de la capitale, aussitôt que les codificateurs eurent terminé leurs travaux. Dans son rapport du 6 novembre 1867, M. Todd dit que le nombre de volumes était de 60,000. Aujourd'hui, après trente-trois ans, ce chiffre a été triplé, car la bibliothèque d'Ottawa contient présentement plus de 180,000 volumes.

A Québec il fallut commencer tout en neuf. De 1867 à 1883, M. L.-P. Lemay, nommé bibliothécaire de la législature lors de la confédération, était parvenu à grouper 30,000 volumes. C'était autant qu'on pouvait espérer dans les circonstances, étant données les difficultés inhérentes à toute organisation, avec un subside annuel très modéré. Au printemps de 1883, le feu vint s'abattre sur l'hôtel du parlement et le détruisit intégralement. On parvint toutefois à sauver environ 4,500 volumes, qui formèrent le noyau de la nouvelle bibliothèque.

Depuis 1883, c'est-à-dire depuis dix-neuf ans, la bibliothèque de la législature est arrivée à un chiffre plus élevé que celle du Canada tout entier à l'époque de la confédération. Elle possède présentement près de 63,000 volumes reliés et 14,000 brochures. Il nous a fallu trente-cinq années d'efforts et de travail pour parvenir à un aussi beau résultat.

II.—*Etude ethnographique des éléments qui constituent la population du Canada—Origine de la population canadienne.*

Par SIR JAMES MCPHERSON LEMOINE, D.C.L.

Membre honoraire de la Société d'Ethnographie de France.

(Lue le 27 mai 1902.)

II

"Tracer l'origine des groupes divers qui habitent l'Amérique-Britannique—fixer l'ère exacte—décrire les causes de leur migration et de leur établissement—déterminer la proportion dans laquelle chaque race a contribué à la formation de la population complexe des huit provinces du Canada confédéré."

Tel est le programme que je me proposai en 1892 et que je discutai sous une de ses phases—l'élément français—dans une étude lue en présence de la Société Royale du Canada—laquelle étude fut reproduite dans les Mémoires de la Société, publiés cette même année.

J'entends, aujourd'hui, continuer cette discussion et fournir un bref aperçu d'un autre élément fort notable de notre population—les *U. E. Loyalists.* Ces recrues nous venaient d'au-delà de la frontière sud—c'est-à-dire des provinces anglaises révoltées: ils se groupaient, vers la fin du siècle dernier, en colonies ou individuellement; tous, des types de loyauté envers leur souverain légitime, le roi de la Grande-Bretagne. Ce n'étaient pas des colons ordinaires: ils étaient assez intelligents, assez industrieux, assez civilisés, pour fonder des villes à l'est du Canada et pour contribuer puissamment à l'établissement de la riche province d'Ontario à l'ouest. Ce groupe prit plus tard le nom de *U. E. Loyalists*: c'est-à-dire, de loyaux sujets et de partisans de l'Empire Uni de l'Angleterre. Ils avaient refusé de faire partie du grand schisme national de 1775-83. Tout en dénonçant les mesures arbitraires du roi George III, à leur égard, ils comptaient voir leurs torts redressés par des voies constitutionnelles, sans recourir à la force.

Ils durent leur nom de *U. E. Loyalists* à un ordre en conseil du parlement impérial, en date du 9 novembre 1789, lequel statuait "Que tout Loyaliste qui aurait épousé la cause de la Grande-Bretagne, avant le traité de séparation en 1783, ainsi que ses enfants des deux sexes, aurait droit d'apposer à son nom, comme distinction, les lettres U. E. pour perpétuer le souvenir de sa fidélité à l'Empire Uni de la Grande-

Bretagne: plus d'un descendant à l'heure présente se fait gloire de ce titre de *U. E. Loyalist.*

La prise de possession et l'établissement de ces loyaux sujets sur le sol britannique de ce côté de la frontière, fut pour eux un temps d'épreuve, de privation, de misère : leur indomptable courage, instinct de race, devait triompher.

Le sort des armes, après de sanglants revers, ayant assuré à George Washington des victoires décisives, le parti royaliste à Boston, à New-York, à Philadelphie — vaincu, proscrit, découragé, n'eut d'autre alternative que de quitter foyers, richesses, position, honneurs, et de prendre la voie amère de l'exil. Quelques-uns des bannis pénétrèrent à travers la forêt au Canada, exténués de fatigue, mais non découragés.

Le gros de la bande—plus de 50,000—dût s'expatrier, en se confiant aux vaisseaux anglais nolisés pour cet objet, par les autorités impériales dans les ports de Boston, de New-York, etc.

Notre aimé lieutenant-gouverneur, Sir Guy Carleton, avait mission de pourvoir à leur embarcation sur des vaisseaux de guerre et sur des navires marchands, retenus pour ce pénible service.

Il était grand temps pour eux de quitter le territoire révolté et de quérir une autre patrie ; leurs biens avaient été confisqués ; on les brulait en effigie sur les places publiques ; on fit subir à quelques-uns la peine du carcan. Malgré les stipulations du traité de 1783, le peuple, pris de frénésie, harcelait sans pitié des citoyens qui, peu de temps auparavant, jouissaient de l'estime générale.

Leur présence sur le sol acadien, maintenant le Nouveau Brunswick, etc.,—en mai 1783—devait rappeler les scènes et les tristes souvenirs qui avaient marqué le départ des déportés acadiens—à la fatale journée de septembre 1755, près de trente ans auparavant. La Nouvelle-Angleterre eut, elle aussi, ses exilés, ses émigrés.

“ Les Huguenots et les émigrés français de 1789, dit M. Harris, pouvaient à raison de leur industrie, leur intelligence, leur civilisation, trouver refuge dans des pays civilisés. Les Maures exilés de l'Espagne, les Espagnols, aux Pays-Bas, chassés par les Hollandais, et devenus libres, furent traités avec humanité. La révocation de l'édit de Nantes fut un arrêt de mort civile aux Huguenots; aux *U. E. Loyalists*, le traité de 1783 de la part des Américains fut plus qu'un arrêt de mort civile.”

La civilisation moderne telle que nous l'entendons ne semblait pas exister parmi le parti victorieux chez nos voisins ; le sexe même le plus faible fut en butte à la proscription et à la confiscation de ses biens: l'histoire nous donne des actes révoltants de spoliation.

" Longfellow, ajoute M. Harris, a immortalisé les Acadiens ! N'y avait-il pas des Evangeline parmi les Loyalistes ? Oui ! et plus d'une, ajoute-t-il.

" Il est admis maintenant par de graves histoires que la révolution de 1775 fut l'œuvre d'une énergique minorité, qui réussit à pousser une majorité, quelquefois irrésolue, indécise, vers un but qui lui souriait peu, et à l'acculer de pas en pas dans une situation d'où il n'existait pas d'issue.

" Dans la loi *Act of Bannishment*, sanctionnée par l'Etat du Massachussetts, en septembre 1778, contre les chefs les plus en vue des Loyalistes, l'on rencontre les noms de 310 de ses citoyens. La liste se lit comme le Palmarès (*Bead-roll*) des familles les plus vertueuses et les plus anciennes: celles qui ont donné à la Nouvelle Angleterre sa civilisation. Nos historiens modernes les plus accrédités, dit encore M. Harris, nous peignent nos ancêtres, les Loyalistes, comme les égaux de leurs contemporains en vertu civique, en sincérité, en intelligence, mais n'en différant que par leur attachement à leur souverain."

Quoique, sans exceptions, tous étaient disposés à résister aux mesures oppressives de la mère-patrie, ils étaient toutefois d'opinion que des remontrances calmes mais énergiques, suffiraient pour faire redresser leurs griefs. Les Loyalistes étaient fort attachés à la mère-patrie; ils étaient fiers du lien qui les y reliait: leur fidélité alimentait leur confiance et leur droit à sa protection. Ils ne pouvaient se persuader que dans un conflit avec elle, les colonies seraient victorieuses. Leur loyauté leur inspirait de l'horreur pour l'anarchie et de l'amour pour les procédés constitutionnels. Un des plans favoris de la république naissante fut la confiscation des biens des Loyalistes: chaque Etat y eut recours.

Ni le Congrès, ni aucun Etat n'avait fait de recommandation de traiter avec humanité les Loyalistes. John Adams avait écrit d'Amsterdam " qu'il aurait pendu son propre frère, s'il eut fait cause avec ces derniers ". [1] (*Ed. Harris.*)

---

[1] At the Treaty of Peace, 1783, their banishment and extermination was a foregone conclusion. The bitterest words ever known to have been uttered by Washington, were in reference to them. "He could see nothing better for them than to recommend suicide." Sir Guy Carleton wrote in 1783 to the Minister at Philadelphia to explain the delay in evacuating New York: "The violence in Americans, which broke out soon after the cessation of hostilities, induced the number to look to me for escape from sudden destruction, but these terrors have of late been so considerably augmented that almost all within these lines conceive the safety of both their property and their lives depends upon being removed by me." . . . . (*History, etc., of United Empire Loyalists*, by Edward Harris, p. 4.)

Les historiens fixent le chiffre des Loyalistes déportés de New-York, etc., en 1783, de 30,000 à 35,000.

Sir Brook Watson, chargé de surveiller l'embarcation des proscrits, écrit: " En 1783, comme Commissaire-général de l'armée, je dus, sous les ordres de Sir Guy Carleton, expédier 35,000 Loyalists de New-York, se refugiant dans la Nouvelle-Ecosse " (le Nouveau-Brunswick en faisait alors partie).

Le 1er mai 1784, le rôle officiel mentionne 33,682 hommes, femmes et enfants, recevant des rations (victuals) dans la Nouvelle-Ecosse.

Cependant, l'émigration datait d'une époque antérieure.

La Nouvelle-Angleterre avait vu, de 1760 à 1770, un bon nombre de ses fils les plus industrieux alléchés par la richesse et la fertilité des terres désertées par les Acadiens, s'y établir : le Major Lawrence, gouverneur du Massachussetts, avait dès 1758 publié et fait circuler dans toutes les colonies anglaises des proclamations préconisant le sol, comme offrant de grands avantages aux futurs colons.

La métropole, si florissante depuis, St-Jean, au Nouveau-Brunswick, fut fondée le 23 mai 1783 par les Loyalistes, dont l'avant-garde de 5,000 âmes débarquait d'une flotte anglaïse le 18 mai 1783 ; on en fêtait pompeusement le centenaire, le 18 mai 1883. Une tradition micmac va à dire que la ville actuelle occupe le site Menagwées, où le divin Glooscap, le puissant Manitou des Micmacs, avait jadis son wigwam.

Le 24 juin 1604, jour de la fête de Saint Jean, Champlain et de Monts avaient découvert le site de St-Jean, d'où lui est venu son nom. Parmi les émigrés Loyalistes, il ne faut pas oublier un corps de nègres—près de 3,000—dont une portion avait recouvré sa liberté à la publication de la proclamation de Sir Henry Clinton et que Sir Guy Carleton refusa, la guerre finie, de vendre à leurs anciens maîtres. On compte parmi les émigrés pas moins de soixante gradués des Universités de Harvard, Yale et autres collèges américains, ayant occupé antérieurement les postes les plus élevés, dans les anciennes colonies: des descendants des Puritains de la Nouvelle-Angleterre, des " Cavaliers " de la Virginie, des Huguenots de France.

L'illustre homme d'état, Joseph Howe, était le fils d'un des propriétaires du *Boston News Letter*, le premier journal permanent de la république voisine. Menir Huntingdon fut le père de l'hon. Lucius Seth Huntingdon, l'ami de l'hon. Joseph Howe.

Les Robinson, les Tisdale, les Merritt et autres, fondateurs de familles bien connues, dans Ontario, s'établirent d'abord dans les provinces maritimes. Pendant plus d'un siècle, les noms des Ludlow, Putnam, Botsford, Winslow, Chandler, Chipman, Westmore, Parker, Ward, Allen, Robinson, Halliburton, Wilmot, Cunard, Bliss, Odell, Inglis et bien d'autres figurent avec distinction dans les archives des provinces maritimes.

Une des premières indications de la présence des Loyalistes en Canada, ce fut la fondation des deux provinces: le Nouveau-Brunswick et la province du Haut-Canada, maintenant Ontario, et la consolidation des aspirations de la Grande-Bretagne, dans le continent de l'Amérique du Nord. On voit des preuves de ce sentiment dans les manifestations provoquées par la guerre de 1812—pour assurer à l'Angleterre sa supériorité. Cet élément nouveau, pendant plus d'un siècle, a fourni des titulaires aux charges les plus élevées, tout en continuant d'exercer une influence puissante sur le progrès intellectuel, politique et matériel de la contrée entière.

Il a fourni au Canada seize lieutenants-gouverneurs, dix-huit juges-en-chef, trois premiers ministres des provinces, depuis 1867, quinze ministres du Canada confédéré. Parmi ceux-ci, sept sont devenus lieutenants-gouverneurs, depuis la Confédération : E.-B. Chandler, L.-A. Wilmot, R.-D. Wilmot, S.-L. Tilley, Joseph Howe, Sir R. Hodgson, G.-B. Robinson. Les ministres des Finances sont Sir S.-L. Tilley, M. Foster, M. Fielding et Sir R. Cartwright. Hon. M. Hardy, ex-premier ministre d'Ontario, est de descendance loyaliste.

L'on peut ajouter à cette liste d'autres ministres du cabinet : J.-H. Pope, W.-D. Vail, Alfred Jones, Sir Charles Tupper et son fils, Sir Herbert. Les lettres, les sciences, l'instruction publique nous fournissent les noms de Chs.-G.-D. Roberts, James Hannay, Bliss Carmen, D^r^ Theal, G.-F. Matthews, Barrie Stratton, L.-O. Raymond, G.-U. Hay, W.-F. Ganong, tous enfants du Nouveau-Brunswick.[1]

Nous venons de voir les 35,000 émigrés Loyalistes à l'œuvre, restaurant à la culture le fertile territoire alluvial des Acadiens, fondant une ville en 1783, se fixant aussi sur divers points du littoral de l'Atlantique, soit pour la culture des terres, soit pour l'exploitation des pêcheries.

Plus tard, séduits par les proclamations du lieutenant-gouverneur du Haut-Canada, le colonel John Greaves Simcoe, lancées du sein de Newark (plus tard Niagara) sa capitale forestière, un vigoureux détachement de Loyalistes, près de 10,000, se détacheront graduellement de la colonie-mère et jetteront les yeux vers la nouvelle province créée sous le nom de Haut-Canada par la constitution impériale de 1791.

Le brave colonel Simcoe ne fut pas lent à découvrir chez ces industrieux Loyalistes, amants de la liberté constitutionelle et du progrès, tout juste l'espèce de colons pour alimenter la capitale de la nouvelle province dont il entendait toutefois changer le site, comme étant trop voisin de la frontière ennemie pour offrir des garanties de sûreté. Après exploration de la contrée, le lieutenant-gouverneur Simcoe choisit un endroit sur la rive du beau lac Ontario, où il fonda en 1793 la présente capitale de la province d'Ontario, d'abord sous le nom de York, en honneur du fils du roi de la Grande-Bretagne ; plus tard, la ville naissante prenait, en 1834, en recevant sa charte, le nom qu'elle porte encore, *Toronto* " the Queen City of Ontario ".

---

[1] *The Story of the U.E. Loyalists*, by Sir J. G. Bourinot.

Au printemps de 1794, le lieutenant-gouverneur Simcoe, escorté d'un corps de Rangers, vint résider à York. Fort lents cependant furent les progrès de la nouvelle capitale. En 1795, le voyageur français La Rochefoucauld décrit York comme possédant 12 maisons, à part des casernes où le militaire était logé. York, plus tard Toronto, a été de tout temps fidèle aux traditions de ses fondateurs, les *U.-E. Loyalists:* c'est encore la ville la plus anglaise du Canada entier.

Deux historiens surtout ont contribué à mettre au grand jour le mémorable déplacement en Amérique, en 1783: MM. Sabine et Ryerson, et les archives du Canada, sous la direction du D^r^ Douglas Brymner et de M. Richard, contiennent une foule de rapports, de lettres, etc., se rattachant à cette période de notre histoire. Ces écrivains mentionnent élogieusement l'arrivée et l'établissement dans leur florissante province, des " 10,000 fondateurs de la prospérité du Haut-Canada ".

Vers 1863, le Canada à l'ouest comptait parmi ses hommes d'état les plus distingués, un fils de Loyaliste — l'hon. William Hamilton Merritt, M.A.L., celui-là même à qui l'on doit le grand canal Welland.

M. Merritt, frappé, comme bien d'autres, de l'absence de renseignements précis et de l'obscurité qui régnaient sur le berceau de la colonisation et l'occupation des terres incultes de cette fertile contrée, obtint de la Législature de sa province l'autorisation de faire recueillir tout ce qui tendrait à jeter du jour sur cette période : lettres, récits, rapports, traditions, etc. M. Merritt fit choix pour cette mission, d'un industrieux littérateur de la ville de Cobourg, H.-C., M. George Coventry. Son rapport, documenté de curieuses pièces, sans être complet, n'en est pas moins intéressant à lire : il est intitulé: " *Outline of a few conspicuous U. E. Loyalists, who fled to Nova Scotia and Upper Canada, after the American (1783) Revolution with personal reminiscences of early settlers.*" *Parliamentary Manuscripts collected by Geo. Coventry, Esq.*

Il me fut donné de jeter un coup d'œil sur le travail de M. Coventry, alors déposé à la bibliothèque du Parlement, à Québec, en 1863, et d'en extraire des notes que je publiai dans les *Maple Leaves* pour 1864. J'ai fort regretté depuis que la translation à Ottawa de cette bibliothèque m'ait privé de pouvoir y continuer mes recherches.

" On peut affirmer, écrit M. Coventry, que le Haut-Canada (Ontario) a été fondé par les Loyalistes américains, expulsés de leur patrie après la guerre de la Révolution (1775-83) ".

A l'exception du territoire français autour de Détroit, protégé par un vieux fort français, la contrée entière était déserte et inhabitée.

A ces indomptables colons était échue la tâche de soumettre la forêt et d'en assujettir le sol à la culture: très rude fut cette tâche. Moyens de communication, routes presqu'impraticables à certaines saisons de l'année.

Un chemin ouvert par les autorités militaires conduisait de Montréal à Toronto. Un sentier sauvage, protégé par un fort à Penetanguishene, garni de soldats, se prolongeait de ce lieu jusqu'à Toronto: des courriers indiens faisaient le service postal sur cette route.

Le gouvernement anglais déploya une grande libéralité, pour encourager l'établissement de la contrée ; dons gratuits de terres, instruments d'agriculture, provisions de viandes, matériaux pour bâtir, octroyés généreusement aux pères de familles, ou à leurs enfants.

Les colons avaient trouvé, dans le gouverneur Simcoe, un protecteur, un sage aviseur. Son Excellence avait commandé un corps de Loyalistes pendant la révolution, les fameux *Rangers*. Des officiers du service le secondaient. On répétait à la nouvelle génération, dès l'âge le plus tendre, la maxime " *Thank God, I am a true Briton !* "

Le gouvernement de la mère-patrie avait voté plus de £50,000, pour subvenir aux besoins des veuves et des orphelins.

Autour des lacs et de la baie de Quinte, où le poisson et le gibier abondaient, l'alimentation était plus facile, moins précaire. M. Coventry note certaines localités où la disette se faisait de temps à autre sentir. En cas urgent on utilisait comme comestible ces gros batraciens que les Anglais nomment *bull-frogs*. Au reste, un salmis de grenouilles valait bien les pâtés et les *steaks* de chair de cheval que Lévis faisait servir à ses soldats, à Montréal, en 1758, ou bien encore les consommés aux rats dont, faute de mieux, se délectait le peuple de Paris, en 1870.

M. Coventry mentionne parmi les premiers colons du Haut-Canada, des noms dont le souvenir s'est perpétué jusqu'à nous: " Robinson, Gamble, Lyman, Baldwin, Sir James McCaulay, Hon. John Wilson, John Strachan, Capt. James Detrick, Roger Bates, Jos. Brant, Hon. Samuel Crane, Jacob DeWitt, Hon. George Cruikshank, Sir Joseph Brook, Hon. James Crooks, George Brouse, D^r Schoefield, Hon. John Molson, Hon. John McDonald, Thomas Merritt, Jacob Bowman, Hon. Henry Ruttan, Hon. John Elmsley, *Chief Justice*, Hon.

Peter Russell, *administrator;* Hon. Henry Alcock, *Chief Justice*, M. Secord, de Chippewa, Hon. Wm. Hamilton Merritt, Philemon Wright, (le pionnier de l'Ottawa), Col. Clark, Tecumseh, Mr. Clench, John Kilburn, Rév. John Stuart," et bien d'autres.

Faire l'historique de tous ces personnages me mènerait trop loin.

Venons-en à la province de Québec.

Notre province ne profita pas au même degré de la grande émigration anglaise de la république voisine.

Nos archives mentionnent l'arrivée de plusieurs détachements ou familles de Loyalistes, à Montréal, à Québec, à Sorel, à la baie de Quinte, à New Carlisle, à Douglastown, au bassin de Gaspé.

Les succès, les revers de tous ces ardents partisans de la monarchie sur le sol canadien en cette province fourniraient à nos annales bien des pages intéressantes. Avis à nos littérateurs portés vers les recherches ethnographiques.

Je clorai ce bref récit, que je me propose de reprendre plus tard, par la mention des faits et gestes d'un des plus distingués Loyalistes de l'époque: l'hon. William Smith, juge-en-chef, en 1780, de la grande province de New-York, et juge-en-chef, en 1785, de la province de Québec. Cet éminent jurisconsulte, avantageusement connu du monde littéraire, par ses travaux historiques: l'Histoire de la province de New-York depuis la fondation de la colonie, jusqu'en 1732—publiée à Londres, en 1786—naquit à New-York le 18 juin 1728.

Il était repassé de New-York en Angleterre, avec Sir Guy Carleton, en 1784. Ardent Loyaliste au début de la guerre, en 1775, ses connaissances légales, ses services à la couronne, l'amitié du brave général Carleton, lui assuraient d'avance une récompense éclatante de son souverain. George III le nomma, le 1^er^ septembre 1785, juge-en-chef de notre province.

Il débarqua le 23 octobre 1786—avec son protecteur Lord Dorchester, gouverneur-général du Canada—de la frégate *Thistle ;* il avait épousé, à New-York, Miss Janet Livingstone, qui le rejoignit plus tard à Québec. On trouvera, à la page 388 de *Picturesque Quebec*, une longue, intéressante et fort curieuse lettre qu'il adressait de Québec, à son épouse à New-York.

Une de ses filles épousa un Loyaliste bien connu: l'hon. Jonathan Sewell. Il avait, en 1789, dit adieu à l'étude du juge Chipman, de la Nouvelle-Ecosse, pour chercher fortune, comme membre du barreau, à Québec. Ses vastes connaissances légales, sa robuste loyauté lui méritaient plus tard l'éminente position de juge-en-chef de notre province. Il décéda en 1839. L'hon. juge-en-chef Smith expira à sa résidence, rue St-Louis, le 6 décembre 1793. On lui fit d'imposantes funérailles. Le prince Edouard (duc de Kent), père de la reine Victoria, marchait en tête du cortège.

L'hon. juge possédait alors les terrains occupés maintenant par les somptueuses résidences du juge Bossé et du juge Routhier.

Son fils, William, a sa place parmi nos historiens: le premier volume de son *History of Canada* vit le jour en 1815, le second vers 1829.

Par une froide après-midi, pendant l'hiver de 1847, je me rappelle avoir vu défiler le cortège funéraire de l'historien, de sa résidence transformée récemment dans le *Union Club*, rue St-Louis.

[SUITE]

III.—*Le Régiment de Carignan.*

Par M. B. SULTE.

(Lu le 27 mai 1902.)

Depuis un siècle, on demande ce que peuvent être devenus les papiers officiels du régiment de Carignan et, à leur défaut, il a été presque impossible d'aborder l'étude de cette page de notre histoire. Nous avons attendu en vain la découverte des registres, correspondances, bordereaux de paie, etc., qui pourraient fournir sur cette matière des renseignements précis, copieux et concluants. Puisque la montagne ne vient pas à nous, allons à la montagne.

I

L'arrivée des soldats de Carignan (1665) changea la situation du pays en mettant un terme aux courses désastreuses des Iroquois qui duraient depuis quarante ans. La même politique qui envoyait cette troupe pour établir la paix dirigeait aussi une assez forte émigration de cultivateurs vers les bords du Saint-Laurent. Une ère nouvelle s'ouvrait en faveur des colons véritables, car les intérêts de ceux-ci avaient été, jusque-là, sacrifiés au commerce des marchands de fourrures. Mazarin et son régime disparaissaient avec les longues guerres civiles aussi bien qu'étrangères qui avaient tenu la France dans une suite de tiraillements douloureux. Louis XIV prenait en main les affaires du royaume ; Colbert le secondait. Le soleil du "grand siècle" se levait sur le monde—un rayon matinal éclairait la Nouvelle-France.

Les Canadiens d'alors étaient presque tous nés dans la colonie ; leur jeune courage s'adaptait merveilleusement aux calculs de l'administration régénérée. Cette heure propice entre toutes ne fut pas perdue—elle ressemble sur plusieurs points à ce qui arriva, deux cents ans plus tard, à la mise en œuvre de notre confédération.

A propos de quoi envoyait-on au Canada ce régiment français ? Ceci demande une explication des choses militaires de la colonie.[1]

Champlain n'avait fait aucune guerre, si l'on en excepte quelques coups d'arquebuse tirés sur les Iroquois. Il n'avait à sa disposition aucune force militaire. En 1635, quatre mois avant sa mort, il demandait au ministre cent vingt hommes seulement, armés à la légère et, avec cela, il espérait, sous un an, réduire ces ennemis à se tenir tranquilles.

La Compagnie des Cent-Associés entretenait quelques soldats à Québec et aux Trois-Rivières pour garder ses magasins de traite. En 1642, on augmenta leur nombre pour en fournir quelques-uns au fort Richelieu. Une compagnie arriva de France en 1644 et fut dispersée partout, jusque chez les Hurons. En 1647, la population de Montréal était de 40 à 45 hommes, sur lesquels 30 formaient la garnison. Deux ans plus tard, il y avait une sorte de camp volant ou patrouille de cinquante soldats enrôlés parmi les gens du pays pour surveiller le fleuve, de Québec à Montréal. On organisa un noyau de milice en 1650, mais elle ne pouvait guère fournir plus de 75 individus. Chez les Iroquois, en 1657, avec Dupuis, il y avait quelques soldats. La situation militaire était des plus tendues.

Les Andastes, de la Pennsylvanie,[2] faisaient des coups sur les bourgades iroquoises. "Les Andastagueronnos,[3] sauvages belliqueux et redoutés de tous temps des Iroquois supérieurs", déclarent la guerre (1661) à ces derniers. "Nous n'avons plus que les Agnieronnons et les Onneïouterenons contre nous. . . Cette petite partie des Iroquois ne laisse pas de nous être la plus redoutable puisqu'elle seule a fait cette année quasi tous les ravages dont nous avons été désolés. . . De deux milles Iroquois ou environ qu'il y a, en voilà 1500 ou 1600 qui mettent les armes bas . . . Nous n'en aurons plus que 400 ou 500 sur les bras, qui ont eux-mêmes à dos trois nations différentes : les Abnaquiouiois, les Mahingans et ceux qu'on nomme du Levant (les Soccoquis ?) contre lesquels ils reprennent la guerre tout de nouveau, étant si superbes qu'ils ne nous croyent pas dignes d'être mis au nombre de leurs ennemis[4]".

La population blanche du Bas-Canada ne dépassait pas deux mille âmes. Quatre cents guerriers iroquois ne devaient pas en avoir peur.

M. Pierre Boucher partit en 1661 pour demander des secours à la France ; il revint, l'année suivante, avec quelques escouades de soldats et un petit nombre de cultivateurs, mais ce renfort n'était pas suffisant. M. d'Avaugour,[5] qui comprenait sa besogne, insistait auprès du roi pour avoir des troupes. En 1663 il se formait à Montréal une compagnie de milice.

" Les représentations faites par M. d'Avaugour, après la mort de Mazarin, produisirent enfin un certain effet, et M. de Mézy, successeur de M. d'Avaugour, arriva en Canada en 1663 avec un premier[6] convoi de colons et de soldats, bientôt suivi d'un second, qui amenait de la Rochelle 300 émigrants. Sur ce nombre, 75 furent laissés à Terreneuve, 60 étaient morts en route et il n'en débarqua que 159 à Québec, parmi lesquels un certain nombre de jeunes filles[7]".

“ Le roi ne nous a pas envoyé des troupes, comme il l'avait fait espérer, pour détruire les Iroquois. On nous mande que les démêlés qu'il a dans l'Italie en sont la cause, mais il a envoyé à la place cent familles[8] qui sont cinq cents personnes. Il les défraie pour un an, afin qu'elles puissent facilement s'établir et subsister ensuite sans incommodité, car quand on peut avoir une année d'avance en ce pays, on peut défricher et se faire un fond pour les années suivantes[9] ” .

Le 5 décembre 1663 le conseil souverain de Québec dit que le roi a fait espérer d'envoyer l'an prochain des soldats . . . On décide d'augmenter de suite de 15 hommes la garnison de Québec—à raison de 300 livres par an, en monnaie ou castor, au prix du pays.

Colbert écrit, le 18 mars 1664, que le roi va envoyer un bon régiment d'infanterie à la fin de l'année ou au mois de février suivant, afin de réduire entièrement les Iroquois.[10] Le 18 juin, avant que d'avoir reçu cette dépêche, le Conseil Souverain demande l'envoi d'un régiment complet. Le 9 octobre, on décide au conseil qu'il n'y a pas de place dans les petites garnisons du pays pour cinq soldats venus de France cet été.[11] En ce moment, les troupes de Carignan étaient sous ordre pour s'embarquer durant l'hiver.

Rien n'était plus facile aux Iroquois que de tomber sur Montréal, Trois-Rivières et Québec, de tout réduire à néant et d'occuper le Bas-Canada à titre de territoire de chasse, de même qu'ils possédaient le Haut-Canada depuis 1650. Les 2,500 personnes qui composaient toute la colonie française n'offraient pas une résistance comparable aux trente ou quarante mille sauvages écrasés par les Iroquois depuis 1636 et qui tous étaient des guerriers redoutables, disait-on. Cet arrêt dans l'esprit de conquête des Cinq-Nations, n'a pu être occasionné que par les événements qui se passaient à leurs portes, alors que les Hollandais du fleuve Hudson se voyaient aux prises avec les Anglais—et les Iroquois savaient parfaitement que Louis XIV avait contribué à remettre sur le trône d'Angleterre son cousin Charles Ier. Advenant donc le triomphe possible des Anglais à Orange (Albany), les Iroquois se trouveraient serrés entre deux gouvernements européens qui pouvaient leur dicter des ordres. Ce peuple ne s'est jamais payé d'illusion. En tous temps, il a compris ses intérêts sur une large base. Pour se maintenir entre deux périls, sa politique voulait, et a voulu faire un jeu d'équilibre qui lui a réussi jusqu'à 1760, alors que la France a perdu toute valeur. C'est tellement le cas que les Iroquois refusaient d'appuyer les Anglais lorsque la prépondérance de ceux-ci se manifestait et, pour la même raison, ils s'écartaient de l'alliance française sitôt que les Anglais faiblissaient. Ils ne se tenaient avec le plus fort qu'autant que celui-ci ne prenait pas trop d'empire. Ce qu'ils redoutaient (de

1665 à 1760) comme dernière expression, c'était de voir ou les Français ou les Anglais devenir maîtres en Amérique—car alors l'élément sauvage ne compterait plus. Cette prévision s'est réalisée, à tel point que l'argument en question fut le seul sur lequel Pontiac bâtit son système, en 1764.

Voyons maintenant quel secours la France nous envoya en 1665.

II

L'origine du régiment est expliquée par un auteur dont la compétence en ces matières est fort prisée : " Dans le temps que le prince de Condé était dans les troupes d'Espagne, un officier allemand nommé Balthazar, qui y servait, fut attiré au service de la France par M. de Salières qui était son ami. On lui donna un régiment qui prit son nom et il servit en 1636 au siège de Valence sur le Pô ". [12]

Nous sommes en mesure de fournir sur Balthazar des renseignements beaucoup plus complets, grâce à l'un de ses descendants qui demeure à Québec. La famille, en remontant très loin, sortait d'une source noble de la Transylvanie. Le premier qui laissa sa marque en France était colonel d'un régiment d'infanterie allemande et fut créé maréchal de camp par Henri IV. Bientôt après il reçut son coup de mort à la bataille d'Ivry (1590). L'un de ses fils suivit Gustave-Adolphe, roi de Suède, parvint au grade de général-major et s'établit dans la Poméranie suédoise après la paix générale de Munster (1648).[13] Son neveu forma le régiment de Carignan.

" Le fils aîné de Balthazar tué à Ivry se nommait Gacho, devint capitaine des gardes de Frédéric V, électeur palatin, roi de Bohême. Il fut tué à la bataille de Prague (1620) après avoir fait des prodiges de valeur pour couvrir la personne de son maître enveloppé par les Impériaux et qu'il parvint à sauver aux dépens de sa propre vie ". [14]

C'est Jean, né en 1600, fils de Gacho, qui va nous occuper. Après le désastre de Prague celui-ci s'attacha à la fortune du célèbre Mansfeld et, après la mort de ce dernier, entra au service de Gustave-Adolphe qui le remarqua dans les campagnes de Prusse et de Pologne. Ensuite vint la guerre d'Allemagne où il se signala, particulièrement à la bataille de Leipzig (1631) et à celle de Lutzen (1632) où il commandait un régiment allemand et où le grand Gustave fut tué.

Jean était aussi fin diplomate que bon capitaine, aussi le fameux chancelier suédois Alexandre Oxensteirn le chargea-t-il de plusieurs missions auprès de divers souverains et, finalement, en 1634, à la suite de la bataille de Nordlingen, remportée par les Impériaux sur les Suédois, il l'envoya au cardinal de Richelieu auquel il plut et qui l'attira au service de la France, avec le grade de maréchal des camps. Il se distingua en cette qualité aux batailles d'Avesnes (1635), de Buffalora (1636), de Leucate (1637), de Quiers en Piémont (1639), de Casal (1640)—toutes gagnées par les Espagnols—et à la prise de Turin. Richelieu le nomma lieutenant-général quelque temps avant de mourir, après quoi Jean de Balthazar se joignit au prince de Condé et acquit de nouveaux lauriers à Rocroi (1643), à Fribourg (1644), et à Nordlingen encore (1645.)

De 1636 à 1644 ou 1645, il est probable que le régiment de Balthazar accompagna son chef dans les opérations militaires qui viennent d'être mentionnées. Peut-être y eut-il une réforme de ce corps en 1644, puisque l'on dit qu'il se composait "de mille hommes levés en Savoie cette année, par le prince de Carignan",[15] toutefois il paraîtrait que Balthazar conserva sa position à la tête du régiment soit comme colonel actif ou colonel honoraire, car il était souvent employé à d'autres branches du service.

Le duc d'Aumale (*Princes de Condé,* V, 160) dit: "Johann von Balthazar, né à Simmeren dans le bas Palatinat, engagé dans l'armée suédoise, passa au service de France (1634) comme capitaine au régiment de Gassion. Devenu lieut.-colonel (1641) il conduisit six compagnies de ce corps en Catalogne et ce détachement fut le noyau du régiment de Balthazar, resté célèbre dans l'armée française sous le nom de Royale-Cravate. Ayant embrassé le parti de M. le Prince, Balthazar battit plusieurs fois les troupes du roi en Guyenne. Son fameux cheval *Demi-Diable* fut tué au combat de Mugron, en mars 1653."

Consultons maintenant des notes qui ont un rapport plus ou moins direct avec notre sujet mais qui concernent certains officiers qu'on retrouvera plus tard dans la présente étude :

Le 18 avril 1643 le vicomte de Turenne, alors à l'armée d'Italie et récemment nommé maréchal de France, écrivait à sa sœur: "J'ai fait M. de Varenne[16] capitaine de mes gardes". Le 13 septembre 1644, à la même: "J'ai laissé M. de Varenne à Spire[17] pour y commander".

En 1648, dans la campagne du Danube, Turenne envoye le général-major de Varenne prendre la ville de Weilerstack, ce qui réussit parfaitement. Dans une lettre écrite par un officier militaire, le 28 mars 1652, il est dit que, à l'affaire du pont de Gergeau, où Turenne commandait, que le lieutenant-colonel du régiment de Carignan fut blessé à mort. Au combat d'Etampes, le 4 mai 1652, sous Turenne qui luttait contre Condé, le régiment de Carignan, secondé par celui de Broglie, donna l'un des premiers. Le comte de Broglie eut son cheval tué, et son frère reçut une blessure. A la journée du faubourg Saint-

Antoine de Paris, le 5 juillet 1652, où Turenne repoussa Condé révolté, celui-ci avait placé Varenne et Clinchamps en face du corps commandé par Turenne en personne; les régiments de Turenne, Uxelles, Carignan, Clare formaient la gauche de l'armée royaliste.

En 1656, un nommé Talon[18] était auprès de Turenne qui le chargea, à deux reprises, de porter des nouvelles verbales à Mazarin sur les opérations militaires autour de Valenciennes ; même chose en 1657. Le 28 juin de cette dernière année, Turenne écrit à Mazarin : " J'ai envoyé M. de Varenne à Rethel " — ville enlevée aux Espagnols et à Condé en 1653. Le 28 juillet 1657, de Varenne escorte Mazarin avec un détachement. Cette année, le comte Charles de Broglie[19] fait rapport à Turenne sur ce qui s'est passé dans le voisinage de la position qu'il occupe ; c'étaient les préliminaires de la victoire des Dunes remportée par Turenne et qui termina la guerre commencée depuis quarante ans.[20]

Jean de Balthazar ne s'entendant plus avec le prince de Condé demanda de retourner à son ancien chef d'Italie, le comte d'Harcourt, qui commandait alors en Catalogne. Il eut occasion de montrer de la valeur en Espagne comme il avait fait partout. En 1654 il prit la direction en chef de l'armée française de Catalogne, et bien qu'elle fut très reduite en nombre, mal équipée, mal payée, il parvint non seulement à tenir tête aux troupes espagnoles, mais à remporter divers avantages sur elles. M. de Kastner ajoute : " Ayant sollicité de la reine Anne d'Autriche et du cardinal de Mazarin le baton de maréchal de France et un gouvernement, récompenses qu'il croyait dûes aux services signalés qu'il avait, depuis vingt ans, rendus à la France, et ne se voyant payé qu'en belles promesses, il entra (1655) au service de Charles-Louis, électeur palatin, fils de Frédéric V, en qualité de générallissime et de premier ministre ".

Voyons un autre auteur :

" La paix ayant été conclue entre la France et l'Espagne (1659), il se fit une réforme des troupes. Le régiment du prince de Carignan et celui de Balthazar furent mis en un même corps. Les deux commandants conservèrent chacun leur (compagnie) colonelle et leur drapeau blanc. Le régiment s'appela Carignan-Balthazar et les commissions des officiers étaient expédiées sous le nom des deux colonels.... Le colonel Balthazar s'étant retiré, M. de Salières prit sa place et le régiment s'appela alors Carignan-Salières. Les deux colonelles et les deux drapeaux blancs subsistèrent. La colonelle de Carignan était la première et celle de Salières la seconde ".[21] Il y a apparence que ce changement eut lieu en 1660. Le prince était ce que nous appelons colonel honoraire; le colonel actif se nommait Henri de Chapelas sieur de Salières. Le prince garda le régiment jusque vers 1668, alors que celui-ci passa au prince Eugène-Maurice de Carignan, appelé le comte de Soissons.

En 1660 Jean de Balthazar acheta la baronnie de Prangin en Suisse et fut gratifié, la même année, de la bourgeosie patricienne de Berne par la régence de cette république. Il se retira du service de l'électeur palatin en 1668 et vécut dans sa terre de Prangin jusqu'à sa mort arrivée en 1688.

La maison de Carignan tire son nom de la ville de Carignano et est une branche de la famille de Savoie. Thomas-François, prince de Carignan, cinquième fils de Charles-Emmanuel Ier, né en 1596, fut la souche de cette branche. Il suscita des troubles dans le Piémont pendant la régence de sa belle-sœur Christine (1630), devint lieutenant-général en France, après avoir combattu à la tête des Espagnols, de 1635 à 1638, commanda les Français en Italie[22] en 1642 et, par la faveur de Mazarin, reçut la charge de grand-maître de France après la disgrâce du prince de Condé (1650). Il mourut à Turin en 1656. Son fils aîné, Emmanuel-Philibert, était sourd-muet de naissance. Il montra de la valeur au siège de Pavie en 1655. Habile administrateur et entendu dans la diplomatie, il rédigeait des mémoires que Mazarin et Louis XIV lisaient; cela explique sa position à la cour de France.

Comme c'était la coutume à la fin d'une guerre, nombre de régiments furent licenciés, d'autres réduits et amalgamés, ce qui explique l'arrangement intervenu entre Balthazar et Carignan (1659). A ce compte, il ne devait pas rester beaucoup des hommes de 1636 enrôlés sous Balthazar, ni des Savoisiens de 1644 du premier prince de Carignan.

Au temps de Turenne on cite quarante-six régiments d'infanterie ; d'après la date de fondation (qui n'est pas donnée). Celui de Carignan-Salières portait le n° 43, et Broglie le n° 40.[23] Par l'ordonnance du 26 mars 1670, portant règlement général du rang des régiments d'infanterie, celui de Carignan est le 35e sur 51 régiments y énumérés. Il n'y est pas fait mention du régiment de Broglie.[24]

Le XIXe siècle nous a habitués au spectacle des armées permanentes et, par suite de cette éducation, les choses militaires qui remontent à François Ier, par exemple, sont assez mal comprises. On est très disposé à confondre l'organisation des troupes sous Napoléon avec celle de Louis XIV. Les termes et les expressions étant presque toujours les mêmes dans les deux cas, le lecteur est porté à croire qu'il entend ce qu'il lit mais, en somme, il se trompe très souvent.

L'armée c'était la milice. On la recrutait en temps de guerre dans les endroits voisins du théâtre des hostilités, laissant le reste du royaume dormir en paix. Les corps ainsi levés n'étaient pas nombreux, et de plus ignorants du métier, mal habillés, à peine reconnaissables à un semblant d'uniforme et payés quand la fortune souriait à leurs chefs. Il va sans dire que tous étaient fantassins. Ces volontaires—car tels il faut les appeler—entraient en campagne par goût des aventures, avec le désir de s'amuser entre une étape et un combat, attirés aussi par l'attrait du pillage ou l'espoir de faire de bons coups qui leur vaudraient certaines faveurs.

Pour le canon, alors peu en usage dans les marches, il y avait des hommes exercés, portant uniformes et toujours retenus au service. La cavalerie se formait parmi les gentilshommes pauvres. La maison du roi, sous Louis XIV, se composait de ce que la cour avait de plus brillant et passait pour être un corps d'élite, ou ce que fut plus tard la garde de Napoléon. Les Suisses, employés à la protection des demeures royales et princières, étaient revêtus d'habits bariolés très voyants.

Après François II on avait commencé (1560) l'organisation de régiments d'infanterie stables, pour servir de noyau d'armée à la guerre et donner plus de consistance aux opérations suivies. Il en sortait des sergents instructeurs qui rendaient promptement les miliciens habiles à se mouvoir ensemble et à se battre. Cette infanterie " reine des batailles " était très fière de sa position exceptionnelle, aussi l'honneur de lui appartenir était-il prisé dans le peuple. Elle constituait la véritable armée permanente.

En 1660 les quatre premiers vieux corps de troupes de France étaient : Piémont 1560, Picardie 1567, Champagne 1580, Navarre 1589, ce dernier créé par Henri IV aussitôt après la mort de Henri III. Les trois autres régiments étaient restés fidèles à la cause des Valois jusque-là. Aux quatre " petits vieux " comme on appelait Picardie, Piémont, Champagne et Navarre sous la minorité de Louis XIII, on ajouta, en 1619, le régiment de Normandie qui datait de trois ans seulement et eut la première place après les quatre anciens, préséance qu'il conserva avec orgueil. Au milieu des troubles civils et des guerres intestines, aussi bien que des invasions de l'étranger qui marquèrent les années 1610-1654 en France, les cinq régiments ci-dessus demeurèrent toujours fortement attachés à Louis XIII et Louis XIV, autrement dit le parti de la cour.[25]

La compagnie sous le patronage du premier officier du régiment, s'appelait " la colonelle " et avait rang de première compagnie. Le capitaine qui la commandait prenait le titre de lieutenant-colonel, c'est-à-dire qu'il tenait la place du colonel général. Lorsque cette dernière charge fut abolie, celle de lieutenant-colonel en ce sens n'exista plus; la compagnie du maître de camp devint la première et la colonelle la seconde.

" De notre temps (1721) nous voyons des capitaines de diverses espèces. Outre les capitaines en premier ou en chef, il y a des capitaines en second, soit sur la mer, soit sur la terre. Le capitaine en second, dans les troupes de terre, est un officier qui commande une partie d'une compagnie, quand elle est trop forte d'hommes. C'est une place qu'on a donnée quelques fois à des capitaines réformés de cavalerie, pour leur laisser quelque espèce de commandement. On distingue encore le capitaine en pied et le capitaine réformé. Le premier est celui dont la compagnie a été conservée après la réforme des troupes. Le capitaine réformé est celui dont la place ou la charge a été supprimée et qui quelques fois reste dans le même corps, ou est incorporé dans un autre : on lui conserve son titre d'ancienneté, suivant la date de sa commission, ce qui peut lui être avantageux dans la suite. Il y a encore des capitaines reformés en pied : ce sont des maîtres-de-camp dont le régiment a été cassé dans la réforme et réduit à une seule compagnie qu'il commande : c'est ce qui se fit en 1668 après la paix d'Aix-la-Chapelle".

On commença en 1657 à avoir des sous-lieutenants[26] d'infanterie, mais l'usage ne paraît s'être répandu dans les régiments en général que vers 1668. Peu après on les abolit, mais en 1687 le grade reparut " pour placer plus de neuf cents jeunes gentilshommes que le roi faisait élever et former pour la guerre dans plusieurs places frontières du royaume, comme Strasbourg, Longwy, etc. Ordinairement, on casse la plupart des sous-lieutenants à la fin d'une guerre, et on les rétablit quand on en commence une nouvelle.

" L'enseigne d'infanterie, quand il y a un sous-lieutenant, n'est que le quatrième officier de la compagnie ". Il a la garde du drapeau et doit plutôt mourir que de l'abandonner. Un auteur qui écrivait sous Henri IV s'exprime là-dessus avec énergie : " Le malheur avenant d'une défaite, le tafetas doit lui servir de linceul pour l'ensevelir et si c'est une vieille compagnie où le drapeau est usé et déchiré, le bâton de l'enseigne doit lui servir de cierge ".

En 1682, Louis XIV, prévoyant la guerre d'Espagne, institua des compagnies de cadets pour former les gentilshommes âgés de 14 à 25 ans au métier des armes. On les logea principalement dans les places frontières de l'Alsace et de la Lorraine, pour les instruire en tout ce qui pouvait les rendre propres à devenir officiers. C'est pour les utiliser que le roi rétablit le grade de sous-lieutenant en 1687.[27]

III

Le comte Godefroy d'Estrades, maréchal de France, vice-roi d'Amérique, étant retenu comme embassadeur en Hollande (1662), le marquis de Tracy fut nommé lieutenant général du roi dans toute l'Amérique, avec des pouvoirs extraordinaires, le 19 novembre 1663. Tracy était, comme Thémines en 1619, lieutenant général du roi et non pas vice-roi.[28]

" Ordre fut donné au marquis de Tracy, qui commandait alors une petite expédition dans les Antilles, de s'embarquer avec quatre compagnies qu'il avait sous ses ordres, pour le Canada, où devait le rejoindre le régiment de Carignan, fort de vingt compagnies, que l'on allait expédier de France. A cet effet, on nomma M. de Tracy vice-roi de la Nouvelle-France." [29]

" Le roi ayant dessein de relever la gloire des Français dans l'île de Cayenne, d'où nous étions sortis depuis quelques années, et de faire visiter toutes les colonies que nous avons dans l'une et dans l'autre Amérique, fit choix de M. le marquis de Tracy, dont il avait connu la suffisance dans les différents emplois qu'il lui avait donnés en ses armées. Il lui fit expédier une commission des plus amples et des plus honorables qu'on ait encore vues; lui donna quatre compagnies d'infanterie ; voulut que ses gardes portassent les mêmes couleurs que ceux de Sa Majesté ; lui fit équiper les navires nommés le *Brézé* et le *Teron*, celui-là de huit cents tonneaux et celui-ci d'un peu moins, avec plusieurs autres vaisseaux chargés de vivres et de munitions de guerre, de gens à cultiver la terre et plusieurs artisans, et de tout ce qui est nécessaire pour une expédition de cette importance.

" M. de Tracy [30] partit de la Rochelle le 26 février de l'an 1664, étant suivi, outre les troupes, de quantité de noblesse et de vaisseaux bien équipés. Il fut complimenté par les Portugais de Madère et du Cap Vert, avec tout l'honneur qui était dû à sa qualité et à son mérite. M. de la Barre,[31] ayant mis pied à terre, y fut reçu magnifiquement.

" Ensuite, les vaisseaux cinglèrent droit à Cayenne et ils y arrivèrent en peu de temps. M. de Tracy ayant fait sommer le gouverneur hollandais de rendre l'île aux Français, auxquels elle appartenait, ils la rendirent sans difficulté et M. de la Barre s'y arrêta, conformément aux ordres du roi.

" M. de Tracy reçut ordre de se rendre au plus tôt en Canada. Ce fut le 25 avril 1665 qu'il partit de la Guadeloupe. . . le *Brézé* prit sa route vers le Canada. . . il se rendit en un mois dans le grand fleuve du Saint-Laurent." [32]

Louis XIV commençait à tracasser la Hollande qui avait fait frapper une médaille offensante pour le futur grand roi. Colbert en profitait dans l'intérêt de sa politique et poussait son maître à s'emparer des colonies où les marchands d'Amsterdam trafiquaient.

M. de Tracy n'osa pas aventurer le *Brézé* dans le fleuve. Il nolisa deux vaisseaux plus légers et arriva à Québec le 30 juin, malade de la fièvre. Quatre compagnies de troupes étaient avec lui, ainsi que les pères jésuites Claude Bardy et François Dupéron. Quatre compagnies du régiment de Carignan, avec le P. Thiery Beschefer, jésuite, étaient débarquées le 19 du même mois.[33] Voyons ce qu'était devenu le régiment depuis que nous l'avons quitté en 1660.

Les Turcs " campés en Europe ", dominaient la Hongrie et envahissaient l'Autriche. Le danger pouvait s'étendre plus loin. Louis XIV voulut prêter son aide aux populations chrétiennes ainsi menacées. " Le régiment de Carignan faisait partie de six mille hommes de pied, commandés par les comtes de Coligny et de la Feuillade, que la France envoya au secours de l'empereur d'Allemagne contre les Turcs, en 1664, et qui eurent l'honneur de la journée décisive de Saint-Gothard, sur le bord du Raab, où Montecuculi défit complètement le grand vizir Achmet Kouprougli."[34]

Au retour de cette campagne, le ministre Colbert persuada le roi de licencier une quinzaine de régiments dont on n'avait plus besoin et proposa d'affecter à l'augmentation de la flotte l'argent économisé sur cette dépense. Il semblerait que le prince de Carignan s'entendait avec eux puisque l'on invita les hommes libérés qui voudraient s'établir en Canada à se réengager sous M. de Salières et, de la sorte, le régiment se revit au complet aussitôt après avoir été débandé. Cela avait lieu pendant que M. de Tracy était aux Antilles. On voit que les troupes qui l'accompagnaient n'avaient pu se joindre à celles de Hongrie. M. Rameau a raison de dire que le régiment de Carignan devait les suivre à Québec.

C'était la deuxième fois que l'on reconstituait le régiment, par conséquent il ne pouvait pas renfermer d'autres éléments que ceux de la population française, puisque les Italiens, les Espagnols, les Allemands primitifs ne devaient guère se sentir entraînés vers une colonie française et un pays sauvage. Ceux qui se marièrent ici étaient Français de noms, puisque ni les registres des églises ni aucun autre genre de documents ne nous fournissent dix noms qui aient une tournure différente du français.

On a souvent affirmé que nous avons reçu de ce régiment une certaine proportion de sang étranger,[35] mais cela ne semble pas possible vu les faits ci-dessus. En tous cas l'absorption n'a pas tardé, tout s'est fondu dans l'élément canadien. Par la suite des temps, nous avons vu de pareils résultats—et nous en voyons tous les jours.

Lisons la remarque suivante qui a été faite il y a cinquante ans, alors que l'on ne soupçonnait pas les transformations qu'avait subies le régiment au cours des trente années qui précédèrent son départ pour la Nouvelle-France : " La plupart des officiers que nous nommons ici sont qualifiés capitaines, lieutenants ou enseignes au régiment de Carignan, quoique, dans plusieurs actes, on suppose qu'ils avaient appartenu à d'autres régiments que ce dernier. Ainsi, M. Dugué est dit tantôt capitaine au régiment de Carignan, tantôt au régiment de Montaigu et enfin au régiment de Chambelle,[36] ce qui est peut-être une altération du nom de M. de Chambly,[37] alors commandant des troupes en Canada.[38] On peut supposer de là que ces officiers avaient successivement appartenu à plusieurs régiments,[39] et qu'après avoir quitté le service, ils se qualifiaient du nom de quelqu'un des régiments où ils avaient eu de l'emploi. Ainsi, dans les lettres de noblesse de M. de Contrecœur, on lit qu'il avait d'abord été capitaine au régiment de Montizon, qu'ensuite il avait servi dans les chevaux-légers de M. de Créquy et enfin dans le régiment de Carignan dont il avait même eu le commandement d'une compagnie." [40]

Sur ce point important : savoir de quels gens était composé notre régiment, il semble que le doute est levé. Ces hommes étaient Français, non pas Espagnols, Allemands ou Italiens.

Colbert écrivait à Talon, au printemps de 1665 : " Le roi envoie le sieur de Tracy avec quatre compagnies d'infanterie,[41] et le sieur de Courcelles avec mille bons hommes du régiment de Carignan ; il y adjoindra trois ou quatre cents soldats du pays, qui savent la manière [42] de combattre des Iroquois."

IV

Le 5 mai 1665 mourait à Québec M. de Mésy, gouverneur de la Nouvelle-France. Les 19 et 30 juin eurent lieu les arrivages [43] mentionnés plus haut. M. de Tracy déployait le plus de faste possible, croyant par là en imposer aux Iroquois.

Le 16 juillet arriva du Havre à Québec le navire du capitaine Poulet portant douze chevaux [44] qui émerveillèrent les sauvages.

Les quatre premières compagnies des troupes partirent de Québec le 23 juillet, avec le père Chaumonot comme aumônier, pour aller construire le fort Richelieu, à l'endroit où il y en avait eu un autrefois (1642-46) et où est à présent la ville de Sorel.

Une compagnie de volontaires canadiens, sous les ordres de J.-B. Le Gardeur de Repentigny, marchait à partir de Québec, avec les soldats royaux. Tous ensemble parurent aux Trois-Rivières juste à temps pour délivrer ce lieu de la crainte des Iroquois qui, depuis quelque temps, avaient recommencé leurs courses. On dit généralement que les Canadiens placés sous les ordres de Le Gardeur de Repentigny étaient les premiers volontaires enrôlés en Canada, mais nous avons fait voir ci-dessus qu'il y en avait eu d'autres avant 1665.

La Potherie (II, 83) mentionne Lavallière, Saint-Denis, Giffart, Bécancourt, Le Gardeur comme officiers des volontaires canadiens en cette circonstance.

"Les compagnies qui sont arrivées (à Québec) sont déjà parties avec cent Français de ce pays et un grand nombre de sauvages, pour prendre le devant, s'emparer de la rivière des Iroquois, y faire des forts et les garnir de munitions. L'on fait cependant ici un grand appareil de petits et de grands bateaux plats pour passer les bouillons de l'eau qui se rencontrent dans les sauts. Les provisions de vivres et les munitions de guerre sont toutes prêtes, le roi ayant tout défrayé. Il y a un grand nombre d'officiers à cet effet. .. Cette année il doit y avoir deux mille personnes, tant en ce qui est venu qu'en ce qui reste à venir." [45]

Il se passait dans la ville de Manhatte et sur les bords de l'Hudson des événements de première importance. Le roi Charles II d'Angleterre avait donné à son frère Jacques, duc d'York et d'Albany, toute la contrée comprise entre les rivières Connecticut et Delaware ; le colonel Nicolls, au nom de ce dernier prince, enlevait aux Hollandais la ville de Manhatte, qui devenait New-York, et le poste d'Orange qui prenait le nom d'Albany. [46]

"Ce ne sont plus les Hollandais qui sont voisins des Iroquois, mais bien les Anglais, qui se sont rendus maîtres de tout ce qu'ils possédaient et qui les ont chassés. Cette conquête s'est faite par ceux de la Nouvelle-Angleterre qui sont devenus si forts qu'ils sont plus de quarante mille. Ils reconnaissent le roi d'Angleterre pour leur prince, mais ils ne veulent pas en être tributaires. Un habitant [47] d'ici, mais qui n'y était pas bien vu, parceque c'était un esprit de contradiction et de mauvaise humeur, se retira chez les Anglais, il y a environ deux ans, et leur donna, à ce que l'on croit, la connaissance de beaucoup de choses du pays des Iroquois, et du grand profit qu'ils en pourraient tirer pour la traite, s'ils en étaient les maîtres. On croit que ce peut être la raison qui les a portés à attaquer la Nouvelle-Hollande." [48]

Les Anglais du Massachusetts voulaient se débarrasser des guerres sauvages, mais connaissant la faiblesse de la colonie hollandaise des bords de l'Hudson, ils préférèrent s'adresser aux autorités françaises pour combiner avec elles un plan d'action énergique. Le major Gibbons, de Boston, offrait d'anéantir les Agniers [49] moyennant la somme de vingt-cinq mille francs que le trésor français lui payerait pour couvrir ses frais. La proposition n'ayant pas été agréée, les Bostonnais avaient fait jouer d'autres influences.

Tandis que les troupes attendaient aux Trois-Rivières un vent favorable, elles virent arriver, le 3 août, une centaine de canots d'Outaouas (du lac Supérieur) montés par plus de quatre cents hommes qui venaient vendre une abondance de pelleteries. Ils avaient fait cinq cents lieues dans ce but et ils repartirent le 7 avec le P. Allouez qui les accompagna comme missionnaire. La vue des troupes, l'exposé des desseins des Français leur faisaient présager la fin des guerres et, par suite, un développement du commerce. Ils répandirent ces nouvelles dans l'ouest.

Le 6 août 1665 fut inhumé aux Trois-Rivières un nommé Couc, soldat de la compagnie de M. Fromont, tué par la décharge prématurée d'un canon. Cet homme n'est pas Pierre Couc, habitant du Cap de la Madeleine à la date en question.

Le 10 août, M. de Chambly, à la tête des troupes des Trois-Rivières, se mit en route pour traverser le lac Saint-Pierre.

Mentionnons en passant le contrat de mariage dressé à Québec, le 12 août, par le notaire Duquet, entre Henri Brocq ou Brault, sieur de Pomerainville et damoiselle Claude de Chevrainville, en présence du marquis de Tracy, Alexandre de Chaumont, maréchal des camps et armées, Millo-Claude Lebarrois, interprète et agent général de la compagnie des Indes Occidentales, Jean Bourdon, sieur de Saint-Jean et de Saint-François, sa femme Anne Gasnier, Isaac Berthier, capitaine du régiment de l'Allier, servant près M. de Tracy, François de Monteil, sieur de Clairvacq ou Clérac, François de Gauds, sieur de Martainville, Louis de Nazo, Sébastien Villiers, sieur de Daudeville, Jean Laumonnier, sieur de Traversy, enseigne au régiment d'Orléans, Verrier, procureur-général, Du Laurent, greffier, Prudent-Alexandre Taboureau de Véronne, enseigne de M. Berthier. [50]

Le 18 et 19 août jetèrent l'ancre à Québec deux navires chargés chacun de quatre compagnies, avec M. de Salières, colonel du régiment, son fils âgé de quinze ans, et l'abbé Dubois, aumônier. Le 24 août, quatre autres compagnies débarquaient, étant venues sur le navire du capitaine Guyon.

Le 22 août on reçut à Québec la nouvelle que des barques et chaloupes avaient remonté la rivière Richelieu jusqu'au saut près du bassin. Quarante bateaux, de vingt hommes chacun, se trouvaient prêts à agir.

La *Relation* de 1665, dit : " Le second fort, nommé Saint-Louis à cause qu'il fut commencé dans la semaine que l'on célébrait la fête de ce grand saint (25 août) protecteur de nos rois et de la France, a été fait par M. Sorel." C'est le fort Chambly, ainsi nommé par la suite.

M. de Chambly érigea dans ce même mois un fort [51] à Richelieu qui avait un caractère provisoire. Un peu plus tard, M. de Sorel lui donna son nom en le reconstruisant sur des dimensions agrandies. C'était un carré avec trois bastions : deux aux angles, et l'autre au milieu d'une courtine dont les extrémités portaient chacun un demi-bastion. Il existe deux plans de ces ouvrages qui semblent être de 1665-66, et l'un est de beaucoup plus étendu que l'autre.

Le 12 septembre arriva à Québec le *Saint-Sébastien,* avec M. de Courcelles, gouverneur général de la Nouvelle-France, et M. Talon, intendant. Un autre vaisseau, le *Jardin de Hollande,* l'accompagnait. Deux jours après, un troisième, appelé la *Justice,* débarqua huit compagnies.

M. de Salières, malgré son grand âge, se transporta au-dessus du fort Chambly et fit travailler à un troisième fort près des rapides qui sont au-dessus de ce lieu. C'est le fort Sainte-Thérèse.

M. de Courcelles, à peine arrivé à Québec, partit en tournée d'inspection sur la rivière Richelieu.

Le 30 septembre, à Québec, 500 soldats prirent le scapulaire.

" Tous les vaisseaux sont arrivés et nous ont amené le reste de l'armée avec les personnes les plus considérables que le roi envoie pour secourir le pays. Ils ont pensé périr tous à cause des tempêtes qui les ont arrêtés quatre mois dans le trajet. Aux approches des terres, impatients d'une si longue navigation, ils ont trop tôt ouvert les sabords de leurs navires, ce qui a fait que l'air y étant trop tôt entré, la maladie s'y est mise, qui a causé bien de la désolation. D'abord il en est mort vingt, et il a fallu en mettre cent trente à l'hôpital, entre lesquels il y avait plusieurs gentilshommes volontaires, que le désir de donner leur vie pour Dieu avait fait embarquer. La salle de l'hôpital était pleine ; il en a fallu mettre dans l'église, laquelle était remplie jusqu'aux balustres ; il a fallu avoir recours aux maisons voisines, ce qui a extraordinairement fatigué toutes les religieuses, mais ce qui a aussi excellemment augmenté leur mérite." [52]

Le régiment avait cruellement souffert des fièvres contractées sur les navires. Il entra d'abord chez les hospitalières soixante-dix malades atteints du scorbut, et lors du débarquement des dernières compagnies, cent trente autres en une seule journée ; l'Hôtel-Dieu était si petit qu'on mettait de ces malheureux dans le portail et le grenier. M. Talon allait chaque jour les visiter pour encourager les uns et consoler les autres ; il se montra très satisfait du zèle des religieuses et obtint du roi un don en leur faveur de trois mille livres de rente.[53]

" Depuis que nous sommes en ce pays, l'on n'avait point encore vu de si grandes tempêtes sur la mer ni dans le grand fleuve que cette année. Les douze vaisseaux qui sont arrivés ont pensé périr. Le treizième, qui était la frégate de M. de Tracy, a coulé à fond à l'entrée du fleuve, où on l'avait vue. Tous ses gens, toutes ses provisions, tout son bagage a péri, ce qui le recule un peu dans ses affaires, à cause des grandes dépenses qu'il est obligé de faire et du grand train qu'il doit entretenir." [54]

Le 1^er^ octobre quatre compagnies partirent de Québec pour aller attendre M. de Tracy aux Trois-Rivières.

Le 3 octobre, le père Chaumonot rentra à Québec, venant du fort Saint-Louis de Chambly.

Talon écrivait à Colbert, le 4 octobre : " Les compagnies du régiment de Carignan, dont plusieurs sont composées de soixante-six hommes, vont être distribuées dans les forts commencés pour y passer l'hiver, et aussi dans les trois habitations : Québec, Trois-Rivières et Montréal." [55]

Le 15 octobre, jour de Sainte-Thérèse, le troisième fort étant achevé, on lui donna le nom de cette patronne. Déjà des sauvages amis s'étaient cabanés dans les environs et alimentaient du produit de leur chasse les travailleurs et les soldats.

Le fort Chambly était un carré avec trois bastions, l'un au milieu de chacune des trois courtines, et une porte fortifiée au centre du quatrième pan.

Sainte-Thérèse formait un carré un peu long, avec un bastion en fer de lance à chaque angle. Il était haut de quinze pieds, avec double palissade et une banquette en dedans élevée d'un pied et demi au-dessus du sol.

Tard dans l'automne, à ce qu'il paraîtrait, on éleva un quatrième fort à l'endroit où est située la ville de Saint-Jean. Tous ces forts étaient en bois planté comme des palissades.

Le 28 octobre, on apprit à Québec que M. de Salières, ayant fait faire un bateau au fort Sainte-Thérèse, avait envoyé dix-huit ou vingt hommes découvrir l'entrée du lac Champlain, et que ces gens s'étaient avancés quatre lieues sur cette nappe d'eau en admirant la beauté du pays d'alentour. " Ce lac, après soixante lieues de longueur,[56] aboutit enfin aux terres des Iroquois Annieronnons. C'est là que l'on a dessein de bâtir encore dès le printemps un quatrième fort." [57] Ce fut le fort Sainte-Anne. Voyez la carte qui accompagne le présent article et que nous empruntons à la *Relation* de 1665.

Il faut croire que le projet du fort Saint-Jean n'était pas conçu en ce moment, puisque le quatrième fort allait s'établir au lac Champlain. Quoiqu'il en soit, le fort Saint-Jean date de la fin de l'année 1665, et le fort Sainte-Anne (le cinquième) situé sur une île du lac, extrémité nord, a été construit le printemps et l'été de 1666.

Le 31 octobre, M. de Courcelles rentra à Québec, revenant de son voyage " en haut ", où il était allé surveiller les travaux des forts et assigner des quartiers d'hiver aux troupes. M. de Salières arriva à Québec en même temps et, " ils ont eu par ensemble quelques démêlés ", observe le *Journal des Jésuites*. Le 4 novembre, M. de Salières s'embarqua pour aller hiverner à Montréal.

Résumons les arrivages des compagnies: 19 juin 4, 30 juin 4, 19 et 20 août 8, 24 août 4, 14 septembre 8—total, 28. Sur ce nombre, il y en avait 24 du régiment de Carignan.

Le 15 novembre, on apporta à Québec le corps du P. François Dupéron, décédé le 10, au fort Saint-Louis, où M. de Chambly commandait. Pour remplacer ce religieux on désigna le père Albanel, résidant au Cap de la Madeleine, mais il était tard dans la saison, de sorte que ce missionnaire s'arrêta aux Trois-Rivières, où il était encore le 4 janvier, attendant que les glaces fussent prises sur le lac Saint-Pierre pour se mettre en route.

V

On a lieu de croire que M. de Courcelles voulut, contre les avis des gens compétents, faire une campagne d'hiver. Il ne connaissait ni la rigueur du climat ni les obstacles redoutables qui s'opposaient à une pareille marche avec des troupes non-seulement étrangères au pays, mais conduites à l'européenne. Sans l'aide que lui prêtèrent nos milices, c'eut été un désastre complet, comme la retraite de Moscou en 1812.

" Les embassadeurs Onontaguez, Goyogouans et Tsonontouans déclarèrent que leurs alliés, les Agniers et les Oneïouths, ne voulaient pas, dès le même hiver, faire la paix avec nous, ce qui obligea M. de Courcelles de marcher contre, à la tête de cinq cents hommes et d'un bon nombre de Canadiens." [58]

Le départ de Québec eut lieu le 6 janvier 1666. M. de Courcelles commandait, accompagné de M. du Gas qu'il prit pour lieutenant; de M. de Salampar, gentilhomme volontaire ; du P. Pierre Raffeix, jésuite; de cent Canadiens et de trois cents hommes du régiment de Carignan.

" Cette marche ne pouvait être que lente, chacun ayant aux pieds des raquettes, dont ils n'étaient pas accoutumés à se servir, et tous, sans en excepter les chefs et M. de Courcelles même, étant chargés chacun de vingt-cinq ou trente livres de biscuit, de couvertures et des autres provisions nécessaires." (*Relation*, 1666, p. 6.)

Le 10, la petite armée quittait Sillery. Dès le troisième jour, plusieurs se gelèrent le nez, les joues, les oreilles, les doigts, les genoux, et on commença à se plaindre de plaies sur différentes parties du corps. Le " mal de raquettes " se faisait sentir vivement. Quelques-uns, engourdis par le froid, seraient morts sur la neige si on ne les eût relevés et portés sous un abri. Les maisons étaient alors bien rares entre Portneuf et Champlain.

Arrivé au Cap de la Madeleine le 15, M. de Courcelles expédia des ordres aux troupes qui devaient se joindre à son contingent le long de la route. Le 16, il était aux Trois-Rivières où il vit que M. Pierre Boucher, gouverneur du lieu, avait tout préparé selon ses désirs. Ce fut un temps de repos pour les militaires :

Etant rendus aux Trois-Rivières
On fait la nique aux cimetières.
On ne pense plus au passé.
Chacun se trouve délassé.
Le pot bout. On remplit l'écuelle . . .

Un manuscrit en vers que M. Arch. de Léry-Macdonald a trouvé dans les papiers de la famille de Lotbinière et qui nous paraît être du jeune Chartier de Lotbinière, Canadien, officier de l'expédition, renferme des passages qui complètent à propos certains renseignements dont nous avons besoin ici. C'est un badinage quant à la forme. Les vers que nous venons de citer en donnent un aperçu assez exact. L'auteur a été par la suite un homme considéré dans la colonie.

Le 18, M. de Courcelles poursuivit son chemin avec quatre-vingts soldats, quatre officiers français et quarante-cinq Canadiens, par le lac Saint-Pierre pour se rendre au fort Richelieu.

Le 24, les capitaines de la Fouille, Maximin et Laubia, du régiment de Carignan, arrivent de Québec aux Trois-Rivières, avec chacun vingt soldats et quelques habitants des environs, pour se joindre aux trois cents hommes réunis en cet endroit. Le lendemain tout s'ébranle et marche à travers le lac Saint-Pierre jusqu'au fort Richelieu où est M. de Sorel. C'est alors, probablement, que cet officier rebâtit le fort hâtivement planté l'été précédent.

La journée du 25 était excessivement froide. L'on fut contraint de reporter aux Trois-Rivières plusieurs soldats dont les uns avaient les jambes tailladées par les glaces, et les autres les mains, les bras, etc., gelés. Le poète qui nous intéresse était de cette troupe, aussi en a-t-il donné ses impressions :

> Afin de gagner Richelieu . . .
> Mais ce lieu, devenu stérile,
> Ne nous fournissait point d'asile.
> Fallut y faire des remparts
> De neige et de glaçons épars.
> Sous l'abri de la belle étoile,
> Bâtir maison d'un peu de toile
> Et se composer des hameaux
> Avec buchettes et rameaux.

L'auteur parle comme si M. de Courcelles eut été au fort Richelieu. Il dit que les " capots bleus " ou miliciens de Montréal, les rejoignirent à cet endroit. Ils étaient sous les ordres de Charles Lemoine, qui venait de passer cinq ou six mois en captivité chez les Iroquois. Avec lui se trouvait le sieur de Hautmesnil, qui faillit périr dans cette expédition. Les capots bleus étaient au nombre de soixante-et-dix.

M. de Courcelles partait, le 29, du fort Saint-Louis. Les capitaines Petit et Rougemont, le sieur Mignardé, lieutenant de la compagnie colonelle, sont aussi mentionnés à cette date. Le 29 donc, M. de Courcelles se mettait en marche avec cinq ou six cents hommes. Le rendez-vous général était au fort Sainte-Thérèse. On y attendait des Algonquins qui devaient servir de guides sous les ordres de Louis Godefroy de Normanville, le même qui fut procureur du roi, mais les sauvages s'étant enivrés furent en retard, et M. de Courcelles commit l'imprudence de partir sans eux.

> C'est un tour, dit-on, de coquin
> Et, n'en déplaise à l'Algonquin
> Qui s'arrêtait à la bouteille,
> Alors on aurait fait merveille.

Le 30 janvier, toute l'armée quitta le fort Sainte-Thérèse et s'avança avec mille peines et misères, en se trompant de route, jusqu'au 14 février où elle se trouva vingt lieues à l'est des bourgades des Agniers, tout près d'un établissement de Hollandais.

" Les guides ne purent découvrir le chemin des villages des Iroquois et menèrent le parti à Corlard, où l'on ne trouva qu'une cabane d'Iroquois. Le Bâtard Flammand y était aussi avec un parti d'Aniez dont il était le chef." [59]

Arendt van Corlaer commandait vers 1640 un petit fort construit par les Hollandais à six lieues d'Orange (Albany.) Les sauvages et les Français appelaient de son nom le poste où il avait résidé et même donnaient ce nom aux gouverneurs ou chefs facteurs de l'endroit par la suite.

Le Bâtard Flammand, chef iroquois, métis d'un Hollandais et d'une femme agnier, commandait la bande qui tua le P. Garreau sur le lac des Deux-Montagnes en 1656.

Le 15, à six lieues d'Albany, on sut définitivement que la province toute entière était passée aux mains des Anglais, comme nous l'avons rapporté plus haut.

Le 20, samedi, les troupes attaquèrent un cabanage d'Iroquois où ils tuèrent " plus de deux sauvages ", et une vieille femme. Dans une escarmouche en plaine, le même jour, quatre Iroquois succombèrent, mais six Français demeurèrent sur place. La nuit suivante et la journée du lendemain il plut continuellement. Ce dimanche, M. de Courcelles eut divers entretiens avec le commandant du poste voisin, un Hollandais qui servait l'Angleterre depuis l'introduction du nouveau régime. La restauration de Charles II qui datait de cinq ans, avait été soutenue par Louis XIV, de sorte que les deux rois étaient ensemble dans les meilleurs termes.

Malgré l'insuccès de ses armes, le gouverneur français se convainquit que sa présence et celle de son armée dans cette région, au milieu de l'hiver, impressionnait fortement les esprits.

Quelques prisonniers capturés durant le trajet, firent connaître que les Agniers et les Onneyouts étaient allés en guerre chez des peuples situés vers le sud et appelés " faiseurs de porcelaines ", probablement les Andastes, habitants des bords de la Susquehanna. Cette nouvelle acheva de décourager les Français, aussi, le soir du même dimanche, après avoir été bien traitée par les Hollandais, l'armée décampa avec précipitation, marchant toute la nuit et une partie du lendemain. Le soir venu, survinrent les trente Algonquins de Louis Godefroy apportant les produits,de leur chasse, ce qui était à propos, car la disette régnait dans les rangs des soldats.

La Victoire aurait bien parlé
De la démarche et défilé
Que vous avez fait, grand Courcelle,
Sur des chevaux faits de ficelle,
Mais en voyant votre harnois
Et votre pain plus sec que noix
Elle n'aurait pu vous décrire
Sans nous faire pâmer de rire.

Les Agniers revenant dans leur pays au moment où de Courcelles se retirait le suivirent à la piste et le harcelèrent avec adresse, ce qui rendit la situation plus critique que jamais. Dans une affaire d'arrière-garde, le sieur d'Aiguemortes et quatre soldats tombèrent sous leurs coups; il y eut trente Iroquois de tués. Le poète raconte en détail cette aventure et dit que le jeune de Lotbinière (lui-même), qui avait pris la place de M. d'Aiguemortes, fut légèrement blessé.

M. de Courcelles se voyait au milieu du lac Champlain lorsque les vivres lui manquèrent. Il envoya ouvrir une "cache" de provisions qui avait été préparée dans le but d'assister les troupes au retour, mais elle ne contenait plus rien. Les voleurs s'étaient emparé en même temps d'effets valant quatre-vingts piastres de notre monnaie actuelle appartenant au père jésuite Pierre Raffeix et à Charles Boquet, frère donné.

Plus de soixante soldats moururent de faim par suite de ce mécompte. Il ne faut pas oublier ceux qui avaient déjà péri de misère en allant ou revenant, ni ceux qui ne purent résister aux épreuves de la marche depuis le lac Champlain jusqu'à Québec. Les Algonquins et les Canadiens parvinrent à soulager bon nombre de ces militaires, en abattant les bêtes de la forêt et donnant d'utiles conseils à ces pauvres novices sur la manière de se conduire en pareilles circonstances. Le poète décrit longuement, sur un ton gai, les souffrances de cette campagne.

Enfin, le 8 mars, l'armée rentrait à Chambly dans un désarroi lamentable.

Il est évident que le fort Sainte-Anne n'était pas encore construit, car on eût pu s'y ravitailler après la découverte du pillage de la "cache." C'est alors, en apparence, que l'on conçut le projet de placer un fort sur une île du lac. Le capitaine de la Motte-Lucière le termina l'été de 1666. Quant au fort Saint-Jean, il en est à peine fait mention; en 1666, le capitaine Berthier y commandait et le sieur de Rougement était à la tête du fort Sainte-Thérèse.

Rendu au fort Saint-Louis de Chambly, M. de Courcelles rejeta l'insuccès de son entreprise sur les jésuites. Il continua de parler d'eux avec amertume et reproche jusqu'à Québec, où il comprit que sa persistance à faire une semblable opération militaire en février, avec des soldats européens, avait été la cause de sa déconfiture.

Les troupes, dit le poète, passèrent de Chambly à Montréal au lieu de descendre à Sorel:

> Montréal vit la jeunesse
> Au retour conter sa prouesse.

Vers le 12 mars on reprit le chemin de Québec, rive gauche du fleuve. Le soleil brillait avec ardeur. Les hommes, déjà épuisés par la rude campagne qu'ils venaient de faire, ne purent supporter la vue de ces rayons ardents mêlés à la blancheur intense de la neige. Ils subirent la cruelle expérience de l'enflure des yeux que nous appelons le mal de neige.

> Mais le soleil battant à plat
> Et la neige faisant éclat
> Les sieurs Dugal et Lotbinières
> Pensèrent perdre leurs visières,
> Et comme aveugles sans bâtons,
> Ne pouvant marcher qu'à tâtons
> Furent conduits aux Trois-Rivières.

Il paraîtrait qu'il y eut à ce dernier poste quelques infractions aux règles du carême, commencé le 10 mars. Après une telle aventure, cela se conçoit.

M. de Courcelles étant passé aux Trois-Rivières arriva à Québec le 17 mars, connaissant nombre de choses dont il ne soupçonnait pas l'existence avant que de venir en ce pays.

VI

Dans les forts de la rivière Richelieu on avait laissé des garnisons et il y avait sur le lac Champlain un certain nombre d'hommes, avec la compagnie du capitaine Lamotte du régiment de Carignan, qui construisaient le fort Sainte-Anne, au printemps de 1666. Un peu plus tard, au mois de juin, "certains guerriers iroquois rencontrèrent à la chasse messieurs de Chasi, de Lerole, de Montagni, officiers, dont les deux (premiers?) étaient parents de M. de Trasi. Agariata tua messieurs de Chasi et de Montagni, quelques autres Français, et amenèrent M. de Lerole dans leur pays."[60] Nicolas Perrot ajoute : "M. de Noirolle, neveu M. de Tracy, était prisonnier chez les Agniers et les Onéïouths. M. de Chasy, son cousin, fut tué au nord du fort Lamotte dans le lac Champlain. . . . Il partit vers le même temps un chef de guerre considérable du pays des Aniez, ayant trente guerriers sous son commandement, qui ramenaient les prisonniers français qu'ils avaient à Montréal. Il alla se poster avec ses gens à Laprairie, où il n'y avait encore aucun établissement, et y trouva des Onnontagués qui y avaient chassé pendant l'hiver, pour mieux persuader les Français de la solidité de cette paix qu'ils venaient de faire ensemble. Ils apprirent à ce parti nouvellement arrivé que le Bâtard Flammand était à Québec pour y conclure la paix. Ce chef, ayant appris cette nouvelle, ne voulut point passer outre. Il y laissa reposer son parti et s'embarqua avec les Onnontagués qui l'amenèrent à Montréal. Quand il y fut arrivé, on dépêcha un bâteau dans lequel il se mit pour se rendre à Québec. Il trouva la paix faite à son arrivée. M. de Tracy le reçut fort bien et le faisait manger souvent avec le Bâtard Flammand à sa table, car c'était un homme de poids et de considération parmi les sauvages de sa nation. . . M. de Tracy fit commander au mois de mai[61] 1666 un parti de trois cents hommes, français et algonkins, qui recontrèrent le Bâtard Flammand, ayant avec lui M. de Noyrolle et trois autres Français, dont il y en avait un blessé au talon, que M. de Courcelles recommanda en partant au sieur Corlard. Les Français et Algonkins de l'avant-garde, prirent et lièrent le Bâtard Flammand et deux de ses gens, mais sitôt que le gros des troupes eut joint, qui accourut aux clameurs et aux huées des Algonkins, M. de Sorel,, commandant en chef, les fit délier. Les Algonkins en témoignèrent leur mécontentement et se portèrent à dire quelques insolences au commandant, car ils voulaient qu'on les brûlât. M. de Sorel les relança avec tant de feu et de fermeté, qu'ils n'eurent pas le mot à lui répliquer. Vous remarquerez qu'ayant été pris, ils déclarèrent qu'ils venaient en embassade[62] pour parler d'accommodement, et ce qui fut la raison pourquoi M. de Sorel en usa ainsi à leur égard. Il amena ces ambassadeurs avec lui à Québec et les présenta à M. de Tracy qui en renvoya un dans son pays avec une lettre pour M. Corlard, par laquelle il l'assurait de sa parole, pour les faire venir tous en assurance dans la colonie et qu'ils y seraient très bien reçus."[63]

Les Iroquois envoyèrent à Québec des embassadeurs avec mission de parler de la paix et de reprocher aux Français leur agression. Au lieu de les coffrer, on les traita en gens respectables. Durant ces pourparlers (juin 1666) les environs de Montréal étaient infestés de petites bandes qui massacraient les colons. Des coups semblables avaient lieu près des forts Chambly et Sainte-Thérèse.

Au mois de juillet, M. de Sorel, dirigeant une expédition contre le pays des Iroquois, rencontra quelques-uns de leurs chefs à vingt lieues des villages agniers[64] et se laissa persuader qu'il fallait les conduire à M. de Tracy pour négocier la paix. Cette ruse fut prise au sérieux comme toujours. Les troupes rebroussèrent chemin. Rendu à Québec, l'un de ces sauvages se vanta d'avoir tué un officier, M. de Chasy, parent du maréchal d'Estrade—on lui mit la corde au cou.

"M. de Tracy, donnant un jour à manger, témoigna à table combien la perte qu'il venait de faire de M^r^ son neveu lui était sensible, mais que le bien du public l'avait engagé, nonobstant cela, à donner la paix au Bâtard Flammand qui la lui avait demandée. Cela suffisait pour faire comprendre à ce chef orgueilleux des Aniez la douleur que M. de Tracy ressentait de la mort de M. de Chasy qu'ils avaient tué et l'obliger, par bienséance, à diminuer son orgueil. Mais loin de compâtir à la peine qu'il en marquait, il [65] leva, en sa présence et celle de toute la compagnie, son bras, se vantant hautement que c'était le sien qui lui avait cassé la tête. Cette insolence outrée rompit la paix que M. de Tracy avait accordée au Bâtard Flammand et, faisant dire sur le champ à ce chef indiscret qu'il n'en tuerait jamais d'autre, il le fit prendre et lier et, ayant envoyé chercher l'exécuteur, sans le faire mettre en prison, il ordonna qu'il fut étranglé en présence du Bâtard Flammand." [66]

"Le 6 septembre 1666, le sieur Couture arrive avec deux anniés pour l'escorter, dont l'un est de la nation neutre, chef de la brigade qui a tué M. de Chasy. .... Onnonkenrite8i, chef des Sonnont8an ici en personne, avec trois autres, nous prennent en particulier chez nous, le P. Chaumonot et moi (le P. Lemercier) ; nous présentent un collier pour retenir le bras d'Onnontio levé sur l'Annié. Nous répondons 1° que nous ne nous mêlons point d'affaires de guerre, 2° que l'Annié est un étourdi, 3° qu'Onnontio ne souffrira point son insolence, 4° que, quoiqu'il arrive à Annié de la part d'Onnontio, qu'ils sont toujours les bienvenus, etc. .. M. de Tracy conclut d'aller en personne à Annié avec mille ou douze cents hommes ; ainsi la mission du P. Fremin et du P. Rafeix, qui devaient aller à Goiog8en, est arrêtée." (*Journal des Jésuites.*)

Le 14 septembre 1666, "M. de Tracy et M. le gouverneur s'embarquent pour la guerre avec plus de 400 habitants, enfants du pays, volontaires, etc. Il m'a demandé les PP. Albanel et Raffeix ; de notre plein gré nous donnons six hommes, entre autres Guillaume Boivin et Charles Boquet." (*Journal des Jésuites.*)

M. de Tracy était à la tête de six cents soldats et de six cents Canadiens, dont cent dix de Montréal, plus cent Hurons et Algonquins. Il se rendit au fort Sainte-Anne, d'où il repartit le 3 octobre—mais M. de Courcelles, impatient à son ordinaire, avait déjà pris les devants. En cette occasion Pierre Le Gardeur de Repentigny commandait les Canadiens de Québec; Charles LeMoine et Picoté de Belestre dirigeaient les miliciens de Montréal.

"Le 5 octobre, nous apprenons de bonnes nouvelles de l'armée qui est bien de 14 cents hommes. Tous ces messieurs se portent très bien. Ils sont entrés dans le lac de Champlain le 28 ou 29. Le temps est très beau." (*Journal des Jésuites.*)

"Le 9 octobre nous recevons de bonnes nouvelles de l'armée qui sera partie, le 3 ou 4, du fort de Sainte-Anne, qui est quatre lieues dans le lac Champellain. M. de Tracy est en bonne santé, etc." (*Journal des Jésuites.*)

"M. de Tracy partit en octobre 1666, à la tête de quatorze cents hommes, soldats, Canadiens et Algonkins, pour aller contre les Aniez.

Il avait laissé à Sorel, en passant, le Bâtard Flammand qu'il renvoya chez lui après cette campagne, qui fut employée à brûler et jeter dans les rivières les blés-d'Inde de quatre villages, dont il mourut de faim plus de quatre cents âmes pendant l'hiver. Ceux qui vécurent étaient errants ça et là et allaient mendier des vivres chez les Onnontagués, qui les refusaient et se moquaient d'eux en leur disant que le nord-est impétueux avait foudroyé leurs grains par leur faute."[67]

"M. de Tracy, M. notre gouverneur et M. de Chaumont partirent d'ici en personne pour aller au pays des Iroquois agneronons, qui touche à la Nouvelle-Hollande, possédée à présent par les Anglais. L'armée était composée de treize cents hommes d'élite, qui tous allaient au combat comme au triomphe. Ils ont marché par des chemins des plus difficiles qu'on se puisse imaginer : parcequ'il y faut passer à gué plusieurs rivières et faire de longs chemins par des sentiers qui n'ont pas plus d'une planche de large, pleins de souches, de racines et de concavités très dangereuses. Il y a cent cinquante lieues de Québec aux forts qu'on a faits sur la rivière des Iroquois (Richelieu). Ce chemin est assez facile parce que l'on y peut aller en canot et en chaloupe, y ayant peu de portages, mais passer au-delà c'est une merveille que l'on en puisse venir à bout, parce qu'il faut porter les vivres, les armes, le bagage et toutes les autres nécessités sur le dos. . ."[68]

Comme dans la première expédition, les préparatifs manquaient de logique. En sus, les Iroquois, avertis du danger, avaient des forts munis de moyens de défense—de sorte que, pour leur répondre, il fallait transporter des bouches à feu par des chemins à peu près inaccessibles. Il en résulta des délais et de graves embarras pour les troupes. Les approvisionnements manquèrent ; on donna aux commissaires des vivres, le titre dérisoire de "grands maîtres du jeûne" ; ni la nourriture ni l'habillement n'étaient en rapport avec les nécessités du jour.

Les quatre villages des Agniers n'offrirent aucune résistance ; la population les avait évacués ; on les brula, avec les provisions qu'ils renfermaient. Au lieu de poursuivre ce premier succès et d'aller ravager les quatre autres cantons, M. de Tracy ordonna la retraite. Le 5 novembre il rentrait à Québec où l'on célébrait avec éclat "la défaite des Agniers", qui n'était pas du tout une défaite, comme le temps le prouva.

"Le 5 novembre au soir, M. de Tracy retourne d'Annié avec ses troupes d'environ 13 cents hommes y compris les sauvages, à la réserve de 9 ou 10 noyés dans le lac de Champlain. Les Annienguer ayant pris la fuite au bruit des tambours, il a fait brûler les 4 bourgs avec tous les blés : il y avait bien en tout 100 grandes cabanes. On a appris de quelques vieillards restés que tout fraîchement nouvelle était venue que l'armée d'Annontaé avait été défaite par les Andastes." (*Journal des Jésuites.*)

" Le 8 novembre on renvoya le Bâtard Flamant avec un ancien d'Annié. *Item* deux d'Onnei8t, entre autres un capitaine nommé Soenres, avec commission de dire à leurs gens qu'ils aient, entre çi et quatre lunes, à contenter Onnontio sur les propositions qu'il a faites pour le bien des peuples, entre autres qu'ils amènent de leurs familles." (*Journal des Jésuites.*)

" A la fin de la campagne, le Bâtard Flammand fut renvoyé et arriva chez lui où il trouva une désolation entière. Les Aniez s'imaginaient avoir toujours les Français aux environs de leurs villages. Ils le pressèrent de retourner sur ses pas et de demander avec instance la paix. Il ne tarda guères en effet à se rendre à Québec, où il protesta avec toutes les assurances qu'on voudrait exiger de lui, qu'il désirait avoir la paix ; qu'il resterait en otage et qu'il reviendrait lui-même demeurer avec sa famille dans la colonie, pour prouver la sincérité qui lui faisait venir la demander. Ces raisons furent écoutées favorablement ; il ne manqua pas aussi d'accomplir ce qu'il avait promis, car plusieurs de la même nation,[69] à son exemple, vinrent s'établir à Montréal, sans y défricher cependant aucune terre. Ils s'étendirent depuis la rivière des Outaouas jusqu'à la rivière Creuse, où la chasse des castors, des loutres, des cerfs, des biches et des élans est très commune. On les voyait, le printemps et l'automne, descendre dans la colonie,[70] chargés en si grande quantité de toute sorte de pelleteries, que le prix en diminua de plus de la moitié en France." [71]

L'expédition de l'automne de 1666 fut absolument sans résultat. Il ne s'y fit que des bévues ajoutées à celles des deux campagnes précédentes. Les six cents Canadiens qui servaient simplement d'éclaireurs eussent accompli quelque chose de définitif, si la permission eût pu leur en être accordée—mais non ! ils devaient se borner à accompagner les beaux militaires et être témoins de la sottise européenne. Au lieu de faire une attaque à fond, tout se borna à brûler des cabanes.

Ce qu'il mourut de soldats par le froid, la faim et les maladies, dépasse le chiffre de toutes les garnisons que la France nous avait envoyées depuis l'origine de la colonie—il est vrai que ces garnisons avaient toujours été déplorablement faibles.

Durant l'hiver de 1666-67, sur soixante soldats casernés au fort Sainte-Anne, quarante furent malades du scorbut, une affliction qui atteignait toujours les Européens parce qu'ils ne voulaient pas se conformer aux enseignements de l'expérience et qu'ils méprisaient les conseils des Canadiens. On découvrit—chose étonnante—que l'air était infecté au lac Champlain, et l'on transporta les malades à Montréal, en plein hiver.

M. de Tracy voyait des miracles partout. M. de Courcelles se jetait tête baissée dans des périls qu'il ne comprenait pas. La milice canadienne n'était guère regardée comme une aide par la morgue française. Elle seule, pourtant, eut été capable de montrer comment il fallait s'y prendre pour en finir avec les Iroquois. Retournés chez eux après ce triomphe, les habitants eussent pu travailler en paix à leurs terres, protégés par les soldats royaux qui n'étaient utiles que pour gêner les bandes de maraudeurs dans le voisinage des habitations. Ce qui est assez curieux, c'est l'espèce de terreur dont furent prises ces troupes une fois logées dans les nouveaux forts—elles n'osaient plus s'éloigner de leurs retranchements, par crainte des Iroquois. Cette panique gagna les officiers. Là où dix Canadiens s'aventuraient hardiment, cent militaires refusaient de marcher.

Conduites avec une fausse précipitation, les entreprises des Français contre les Iroquois n'avaient réussi qu'à moitié. La première campagne s'était bornée à une pénible et désastreuse marche en raquettes ; la seconde et la troisième remplirent à peu près le but désiré en terrorisant l'ennemi, mais le prestige de nos armes eut à souffrir du flottement des affaires militaires dans ces opérations qui eussent dû être foudroyantes.

Les Cinq-Cantons, inquiétés, non dévastés, non dispersés, sauf celui des Agniers, n'altérèrent en rien leur politique. N'étant pas les plus forts, ils recoururent à leur vieille et toujours salutaire coutume—la diplomatie. De 1644 à 1699, et même plus tard, l'adresse de leurs délégués les sauva de la ruine plus d'une fois. On a trop souvent répété que cette nation avait été subjuguée, anéantie, par les soldats de Carignan ; elle eût dû l'être mais ne le fut pas. Dès 1683, elle reprenait l'offensive et la prolongeait jusqu'à la dernière année du siècle. Ses bandes bravaient de nouveau toute la colonie des bords du Saint-Laurent et semaient la terreur sur les territoires lointains où les Français avaient des établissements—aux Illinois, au Wisconsin, au nord du lac Huron, à la baie James. L'horrible situation appelée les *temps héroïques* (1640-1665) s'était terminée, il est vrai, en 1666, mais elle était redevenue aussi intense en 1689-99.

VII

Le plan de colonisation qui s'exécutait avec assez de vigueur et de sagesse depuis 1661 à peu près, ne pouvait manquer de recevoir un contingent de militaires ; cela entrait dans les projets du ministre qui écrivait à Talon, le 5 avril 1666 : " Le roi est satisfait de voir que le plus grand nombre des soldats... sont disposés à s'établir dans ce pays au moyen de quelque aide supplémentaire qu'on leur donnerait à fin de cet établissement... Cela parait si important à Sa Majesté qu'elle désirerait les voir tous rester au Canada."

Notre population était alors de 600 familles ; elle ne pouvait pas recevoir d'un seul coup 1,000 ou 1,200 hommes : c'eut été un fléau, un écrasement, aussi croyons-nous, d'après divers indices, que le chiffre des soldats licenciés ne dépassait pas 400, dont plus d'un cent devinrent coureurs de bois et ne firent rien pour la colonie ; une autre centaine exercèrent des métiers ou furent domestiques à Québec, Trois-Rivières et Montréal ; deux cents optèrent pour l'agriculture, après avoir servi trois années chez les " habitants ", selon la loi du pays.

Dans le règlement[72] du Conseil Souverain, du 24 janvier 1667, au sujet de ces matières, il est dit que certaines clauses concernent " les soldats du régiment de Carignan-Salières ou des garnisons des forts de Québec, des Trois-Rivières et Montréal ", ce qui embrasse les compagnies venues par la voie des Antilles avec M. de Tracy en 1665.

Parlant de la milice canadienne, Talon écrivait en 1667 qu'une " dépense de cent pistoles[73] dans toute une armée, mise en prix pour les plus adroits tireurs, exciterait bien de l'émulation au fait de la guerre ".

" Le 2 avril 1667, nouvelle arrive de Montréal, que les cinq nations témoignent une bonne disposition pour la paix. Le 20, le Bâtard Flammant, avec deux Onnei8t arrivent, sans avoir amené ni Hurons ni Algonquins, ni familles, qu'on leur avait demandés. Le 27, on prend résolution en conseil de retenir ici toutes les femmes et de renvoyer les hommes dans le pays, à la réserve de deux, avec protestation de la part de M. de Tracy que si, dans deux lunes, ils n'obéissent et n'exécutent les articles proposés, notre armée partira pour les aller ruiner dans le pays." (*Journal des Jésuites.*)

Le 28 août 1667, M. de Tracy s'embarqua sur le *Saint-Sébastien* pour la France, amenant des troupes avec lui.

La mère Marie de l'Incarnation écrivait le 18 octobre 1667 : " On dit que les troupes s'en retourneront l'an prochain, mais il y a apparence que la plus grande partie restera ici, comme habitants, y trouvant des terres qu'ils n'auraient peut-être pas dans leur pays."

Les événements survenus en Europe paraissent avoir hâté le rappel des troupes du Canada. L'Angleterre et les Pays-Bas étaient en lutte ouverte dès 1664, ce qui inspirait à Colbert la création d'une marine pour relever le prestige de la France dans le commerce maritime, de même qu'aux colonies. La paix de Bréda (ville de Hollande) signée le 25 juillet 1667 entre l'Angleterre, les Provinces-Unies et la France, leur alliée, régla le sort de la Nouvelle-Belgique (le New-Jersey et New-York) qui devint définitivement possession anglaise, en échange du privilège accordé aux Hollandais d'importer en Angleterre leurs marchandises descendant le Rhin ; la France recouvra l'Acadie (prise en 1654) moyennant l'abandon à l'Angleterre des îles Antigoa, Montserrat et Saint-Christophe, dans les Antilles.

Louis XIV, se croyant assuré de la complaisance de Charles II, songea à exécuter ses projets à l'égard de la Hollande qui était la seconde puissance maritime, l'Angleterre étant la première depuis Cromwell. Sous prétexte de revendiquer les prétendus droits de sa femme espagnole, Marie-Thérèse, sur la succession du roi d'Espagne, Louis XIV engagea (1667) la guerre dite de dévolution, envahit la Franche-Comté et s'empara de douze villes des Flandres. "Les Hollandais prirent ombrage d'un prince aussi belliqueux et aussi avide. Préférant garder pour voisin le roi d'Espagne, faible et éloigné, ils formèrent avec l'Angleterre et la Suède une alliance à l'effet d'arrêter Louis XIV. Celui-ci dut céder et rendre ses conquêtes par le traité d'Aix-la-Chapelle (1668), mais son irritation subsistait et il méditait une revanche contre ce petit peuple protestant et républicain qui se permettait ainsi de lui faire échec. Les relations restèrent donc fort tendues et, bientôt, une guerre de tarifs prépara la rupture complète—ce qui eut lieu en 1672." [73a]

"Le roi donna l'ordre de faire rentrer en France le régiment de Carignan et les quelques compagnies, appartenant à d'autres corps, qui l'avaient suivi. Quatre compagnies de Carignan, choisies parmi celles dont les capitaines s'étaient mariés dans le pays ou étaient disposés à s'y marier, furent laissées en arrière, afin de conserver les forts les plus avancés et défendre les habitants contre les incursions des ennemis. Le roi ayant averti les officiers qui allaient rentrer en France, qu'il serait fort aise si une partie de leurs soldats consentaient à demeurer dans la colonie, il resta en tout plus de quatre cents hommes décidés à adopter le Canada pour leur patrie. On distribua à chaque soldat cent francs, ou cinquante francs avec les vivres d'une année ; chaque sergent reçut cent cinquante francs ou cent francs avec les vivres d'une année. Douze mille livres furent distribuées aux soldats qui, sans appartenir aux compagnies laissées en arrière, consentaient à rester dans le pays et à s'y marier." [74]

On voit aux archives de la marine, à Paris, les pièces suivantes : Le 12 février 1669, ordonnance du roi pour la subsistance de quatre compagnies d'infanterie étant en Canada, composées chacune de 53 hommes, pendant l'année 1669. Le 22 mars, ordonnance pour la solde et " entretenement " de 25 soldats en chacune des quatre compagnies restées en Canada, pendant l'année 1669. Même jour, ordonnance pour la solde et entretenement, pendant les six premiers mois de l'année 1670, des quatre compagnies d'infanterie qui sont restées en Canada, sur le pied de 78 hommes chacune. Le 25 mars, promesse des capitaines Chambly, La Durantaye, de Grandfontaine, Laubia et Berthier de mettre leurs compagnies sur le pied de 50 hommes chacune, depuis 20 jusqu'à 30 ans, et de leur fournir la subsistance jusqu'à leur embarquement moyennant 1,000 écus. Le 29 du même mois, ordonnance pour la levée et armement de six compagnies d'infanterie qui passent en Canada et pour leur subsistance pendant neuf mois de 1669 et six mois de 1670. [75]

" Sa Majesté envoie 150 filles pour être mariées, 6 compagnies de 50 hommes chacune, et plus de 30 officiers ou gentilshommes, tous pour s'établir en Canada, et plus de 200 autres personnes qui y vont aussi dans ce but." [76]

En 1668, Talon repassa en France et revint en 1670 [77] avec environ 400 émigrants et six compagnies [78] de soldats formant 300 hommes, destinés à renforcer la garnison du Canada et à y devenir colons, au fur et à mesure de leur congédiement." [79]

" Talon repartit pour Québec en 1669, avec un armement de deux cent mille livres. Il fut suivi par près de sept cents émigrants, dont trois cents soldats et plus de trente officiers ou gentilshommes ; ils parvinrent heureusement à leur destination, tandis que lui-même, après une navigation orageuse de trois mois, faisait naufrage sur les côtes du Portugal et se voyait forcé d'attendre à l'année suivante pour reprendre son voyage." [80]

L'été de 1669, Nicolas Perrot se trouvait à Montréal avec les Outaouas qui y faisaient la traite. Il dit: " M. de la Motte, homme de cœur et d'honneur, commandait alors à Montréal ; sa compagnie était la seule du régiment de Carignan restée dans le pays... On posta le long des palissades tous les soldats de la garnison, qui faisaient en tout le nombre de soixante hommes, qui furent commandés par un sergent. . . "

" Il est arrivé cette année 165 filles ; 30 seulement restent à marier. Je les ai réparties dans des familles recommandables jusqu'à ce que les soldats qui les demandent en mariage soient prêts à s'établir. On leur fait présent, en les mariant, de 50 livres en provisions de toute nature et en effets. Il faudrait encore que Sa Majesté en envoyât 150 à 200 pour l'an prochain. Trois au quatre jeunes filles de naissance trouveraient aussi à épouser ici des officiers qui se sont établis dans le pays. Je vous recommande d'envoyer des engagés. Madame Etienne, chargée par le directeur de l'hôpital général de Paris, de la direction des jeunes filles qu'il envoie, retourne en France pour en ramener celles que l'on enverra cette année. Il faudrait recommander que l'on choisît des filles qui n'aient aucune difformité naturelle, ni un extérieur repoussant, mais qui fussent fortes, afin de pouvoir travailler dans ce pays et, enfin, qu'elles eussent de l'aptitude à quelque ouvrage manuel. J'ai écrit dans ce sens à M. le directeur de l'hôpital." [81]

Le 11 février 1671, Colbert écrit à Talon que le roi désire voir les officiers des troupes s'établir en Canada et donner ainsi l'exemple à leurs hommes. Le mois suivant il dit que des officiers des troupes restées en Canada sont retournés en France, mais le roi désire qu'ils se fixent en Canada et que ce sera pour eux le moyen de mériter ses grâces. [82] De tous ces projets, il n'est pas résulté la création d'un empire, mais seulement quelques groupes de cultivateurs aux environs de Montréal et principalement sur la rivière Chambly. [83]

La *Relation* de 1668 (p. 3) note que 400 soldats s'établirent.

D'après le P. Le Clercq, récollet, qui écrivait en 1691, le régiment de Carignan " donna lieu à plus de trois cents familles nouvelles."

" Deux sortes de gens habitent ce pays-ci : les uns sont venus de France avec quelque argent pour s'y établir ; [84] les autres sont des officiers et des soldats du régiment de Carignan qui, se voyant cassés, il y a trente ou quarante ans, [85] vinrent ici [86] changèrent l'épée en bêche, et le métier de tuer les hommes en celui de les faire vivre, je veux dire la guerre en agriculture. Tous ces nouveaux venus [87] ne furent point embarrassés de trouver du fond; on les mit à même de la terre et on leur en donna tant qu'ils en voudraient défricher." [88]

" La paix ayant été conclue, on réforma ce régiment qui s'établit dans le pays. La colonie devint par là considérable par tous les mariages des soldats et plusieurs officiers qui aimèrent mieux rester dans le pays que de s'en retourner en France. . . Le Canada fut longtemps sans troupes, jouissant d'une profonde paix qui dura vingt ans. [89] Je ne suis pas surpris si les Canadiens ont tant de valeur, puisque la plupart [90] viennent d'officiers et de ces soldats qui sortaient d'un des plus beaux régiments de France. . . Des vingt-quatre compagnies du régiment de Carignan-Salières qui étaient en Canada, on en fit repasser en France, au bout de trois ans, et les quatre qui demeurèrent furent composés de soixante et quinze hommes chacune. Il y eut plus de trois cents personnes de ce régiment qui s'établirent dans le pays. Ces quatre compagnies furent encore réformées quelques années après, dont la plupart des réformés firent des habitations. Celles-ci (les compagnies) furent remplacées, la même année, par quatres autres compagnies. Les officiers qui ne voulurent point passer en France eurent des concessions de terre et quelques libéralités que Sa Majesté leur fit." [91]

"Presque tous [92] les soldats, dit Charlevoix, un peu plus tard, s'étaient fait habitants, ayant eu leur congé à cette condition. . . Plusieurs de leurs officiers avaient obtenu des terres avec tous les droits de seigneurs ; ils s'établirent presque tous dans le pays, s'y marièrent, et leur postérité y subsiste encore. La plupart étaient gentilshommes, aussi la Nouvelle-France a-t-elle plus de noblesse ancienne qu'aucune autre de nos colonies, et peut-être que toutes les autres ensemble."

"Les premières troupes (qui arrivèrent en Canada) étaient du régiment de Carignan-Salières. De vingt-quatre compagnies qui y étaient, on en fit repasser vingt en France au bout de trois ans, et les quatre qui demeurèrent furent composées de soixante et quinze hommes chacune. Il y eut près de trois cents hommes de ce régiment qui s'établirent dans le pays, non pas avec des filles de joie, comme le prétend le baron de La Hontan, mais avec des filles et des femmes qui étaient en France à charge à de pauvres communautés, d'où on les a tirées pour les conduire, de leur plein gré, en Canada." [93] Le même auteur ajoute que les quatre compagnies en question furent réformées lorsque les hommes se marièrent et qu'on les remplaça par quatre autres.

Le même Le Beau, qui vivait à Québec en 1727, ajoute: "Le R. P. Joseph, Canadien (Joseph Denys de la Ronde ?) et d'autres vieillards, qui ont presque touché à ces premiers temps, disent que les hommes du régiment Carignan-Salières s'établirent avec des filles venues de France, qui étaient à charge à de pauvres communautés, d'où on les tira pour les conduire en Canada de leur plein gré."

"Ce régiment, quelque temps après, [94] fut embarqué pour passer en Canada, commandé par M. de Salières. La permission que le roi donna aux officiers et aux soldats de se marier en ce pays-là, ruina le régiment et il fut réduit aux deux colonelles [95] qui conservèrent leurs drapeaux blancs et étaient de cent hommes chacune, tous officiers réformés, sergents et vieux soldats. Ce régiment étant repassé en France, le roi le rétablit et le fit de seize compagnies, une desquelles était la colonelle de Salières." [96]

"Comme l'immigration augmentait peu, on permit aux officiers et aux soldats du beau régiment de Carignan de rester en Canada. Des terres leur furent distribuées, avec des secours d'argent pour les aider à commencer leurs établissements. Six compagnies, qui étaient repassées en France avec M. de Tracy (28 août 1667), revinrent en 1669. Les officiers, dont la plupart étaient gentilshommes, obtinrent des seigneuries, dans lesquelles se fixèrent leurs soldats."[97] Est-il certain que les compagnies revenues avec Talon appartenaient au régiment de Carignan ?

"M. de Tracy débarqua avec sa petite armée (1665). Les 14 à 1,500 hommes qu'il amenait étaient, en effet, une véritable armée et un événement considérable pour ces contrées qui n'avaient jamais vu plus de 100 à 150 soldats réunis. . . M. Talon emportait pour instruction de faire tous ses efforts pour déterminer le plus grand nombre des soldats, après l'expédition, à prendre leur congé et un établissement au Canada. Il ne manqua pas de s'y employer et parvint, en effet, à conduire à bonne fin cette importante affaire. Le plus grand nombre des officiers et des soldats acceptèrent ses offres et se fixèrent au Canada. C'était un grand pas dans le peuplement de ce pays, qui n'avait jamais reçu et ne reçut jamais depuis une immigration de cette importance Les officiers obtinrent en concession des seigneuries, et il est probable qu'un grand nombre de soldats prirent des terres sous leurs officiers respectifs. . . Ce licenciement dut procurer plus d'un millier de colons au Canada. Les troupes amenées par M. de Tracy devaient former 1,500 hommes, sur lesquels il faut déduire 300 soldats qui restèrent au service et autant environ pour les hommes morts pendant la guerre et ceux qui purent retourner en France ; restaient donc 8 à 900 hommes que l'on congédia. Si l'on y joint maintenant tous ceux qui suivent nécessairement les armées et que ce licenciement dut forcer à prendre fortune dans le pays, avec le régiment, nous atteindrons facilement, on le voit, le chiffre de 1,000 immigrants. Cette évaluation est encore confirmée par le recensement de 1668, qui mentionne 412 soldats établis, cette année même, dans le pays, mais non encore portés sur le cens. Or, comme en 1666 et en 1667 la plupart avaient déjà reçu leurs terres et s'étaient installés, tout tend à montrer comme très rationnel le chiffre de 1,000 comme nombre des émigrants laissés dans le Canada par le congédiement de cette petite armée. . . Le roi fit à chaque soldat un présent et des avances pour l'aider à s'établir, et quand il se mariait à une des filles que l'on envoyait de France, on donnait cinquante livres à sa femme en provisions diverses. . . En arrivant au Canada en 1665, Talon n'y avait pas trouvé 3,000 âmes, puisque le recensement de 1666, comprenant les colons qu'il avait amenés,[98] ne porte que 3,418 habitants (âmes) ; en 1667 un nouveau recensement[99] nous donne un chiffre de 4,312, et le cens de 1668 porte 5,870 habitants, formant 1,137 familles, sans compter 412 soldats congédiés qui étaient encore à peine établis. . . De ces hommes, quelques-uns trouvèrent des épouses dans les familles mêmes du pays, mais le plus grand nombre fut marié avec les jeunes filles que l'hôpital général de Paris envoyait fréquemment au Canada. Nous savons même par des chiffres positifs qu'avant de pourvoir au mariage de ces nouveaux colons, on expédia alors pendant plusieurs années 150 à 200 filles par an au Canada ; et en général à peine étaient-elles arrivées qu'elles étaient mariées. . . Ces licenciements, répétés coup sur coup, pour aider le peuplement du Canada, et d'après les prescriptions instantes du gouvernement, constituèrent une sorte de tradition invariablement suivie désormais par tous les gouverneurs. Tous facilitèrent, autant que possible, à ceux des soldats qui le désiraient leur établissement dans le pays; et, comme on ne tarda pas à arrêter (fixer) l'entretien normal de 700 hommes à titre de garnison ordinaire, ils devinrent un auxiliaire permanent pour le recrutement de la population. Les soldats entretenus au Canada eurent en outre cette utilité que souvent on les dispersait en cantonnement chez les habitants, où ils pouvaient être pour leurs travaux d'utiles auxiliaires, qu'il eût été impossible de se procurer dans ce pays." [100] Cette étude conclut au chiffre de 1000 hommes, ce qui nous paraît au moins double de la réalité.

" Les soldats du régiment de Carignan qui furent d'abord licenciés, se groupèrent auprès des centres déjà subsistants ; beaucoup d'entre eux épousèrent des filles du pays et entrèrent dans les rangs de l'ancienne population, à laquelle ils communiquèrent un levain de leur esprit militaire. Ils étaient devenus Canadiens par leurs habitudes et leurs affections, quand d'autres compagnies du même régiment furent renvoyées au Canada pour y recevoir leur congé. Ainsi, l'ancienne population s'est toujours maintenue supérieure en nombre aux accessions qu'elle recevait et elle leur a communiqué son type original, tel qu'il s'était formé et développé sous Champlain, sous Montmagny et sous leurs premiers successeurs." [101]

" Le régiment de Carignan, qui fut presque tout licencié ici, jeta sur nos rives une nombreuse population appartenant à la meilleure aristocratie." [102]

En l'absence de pièces officielles nous devons nous contenter des opinions ci-dessus. Il est probable que pas plus de 400 hommes du régiment de Carignan sont restés dans la Nouvelle-France mais, de 1670 à quelques années plus tard, un nombre pareil est sorti des détachements que le roi entretenait dans la colonie, ce qui donnerait raison à M. Rameau, par exemple, qui penche pour 800 ou 900.

Citons enfin un chercheur qui a surveillé cette question depuis longtemps et qui se promettait de la tirer au clair : " Il y a une liste des noms des officiers et soldats du régiment de Carignan qui sont établis au Canada. Leur nombre, diversement évalué par les historiens, était de 403. Le débat sur ce point se trouve, je crois, vidé. J'avertis ceux qui croiraient trouver là le précieux renseignement longtemps désiré, que la trouvaille ne vaut pas ce qu'ils en pourraient espérer.

En effet, on sait qu'à cette époque il était d'habitude à peu près général de donner à tout soldat un sobriquet. Avec le temps ce nom se greffait à sa personne et devenait le seul connu. C'est sous ce nom d'emprunt, dérivé le plus souvent de leurs particularités physiques, morales ou mentales, que sont désignés la plupart des soldats dans cette liste : La Bonté, La Douceur, La Malice, La Joie, Vadeboncœur, Pretaboire, etc. Rendus à la liberté et devenus colons ou artisans, les noms véritables, le plus souvent, furent repris. Il en résulte, on le comprend, un obstacle qui enlève à ce document une partie de sa valeur." [103]

Le relevé officiel de 1675 porte la population du Bas-Canada à 7,832 âmes ; celui de 1676 à 8,415. Le roi trouva ces chiffres trop faibles ; il en exprimait sa surprise dans une lettre du 15 avril 1676, vu, disait-il, " le grand nombre de colons que j'ai envoyés depuis quinze ou seize ans ; on a dû omettre un grand nombre d'habitants ". Le recensement qui suivit indique qu'on ne s'était guère trompé, et celui de 1681 montre qu'on ne pouvait aller au-delà. Il va sans dire que 800 coureurs de bois manquaient à l'appel, mais tout de même Louis XIV avait dû faire des calculs un peu exagérés. En ce moment, il voyait en noir, étant sous le coup des déceptions que lui attirait sa politique à l'égard de l'Europe. La guerre de Hollande, ouverte en 1672 sous des auspices favorables, avait tourné contre lui. Guillaume d'Orange, son grand adversaire, surgissait et, avec une habileté surprenante, unissait de son côté les principales forces du continent. Condé se tenait à l'écart depuis 1674. Turenne venait d'être tué. La faiblesse des généraux français, le vide du trésor, le ralentissement du commerce par suite de la guerre trop prolongée, tout contribuait à diminuer le prestige du monarque dont l'ardeur ambitieuse avait produit ces revers de fortune. Nous n'avions plus à attendre de la France l'aide si nécessaire à une colonie déjà commencée, non encore affermie. Pour surcroit de malheur, le Canada, privé de Talon, ne comptait plus personne pour activer les progrès matériels, l'agriculture en premier lieu. Le comte de Frontenac s'en tenait au développement de la traite des pelleteries. " Il est certain, dit M. Rameau, que, à partir de 1675, on ne trouve plus dans les actes du gouvernement français le zèle qu'il avait montré précédemment pour le Canada. [104] Plus de sollicitude active, plus d'envois de colons, à peine quelques recrues pour les troupes, et un abandon de plus en plus prononcé de la colonie à sa propre faiblesse." Ce qui sauva le pays de la ruine et maintint tant bien que mal la situation, ce furent les enfants du sol. La colonisation avait pris une assiette solide et, si peu étendue qu'elle nous paraisse à cette époque, son rôle primait tous les autres moyens d'existence; elle résista même au fâcheux entraînement du commerce des pelleteries, mais non sans éprouver sur ce point des pertes en hommes, qui ne pouvaient se compenser. Les fonctionnaires, étrangers aux intérêts canadiens, ne se faisaient pas faute d'affaiblir le noyau des cultivateurs en dirigeant vers les courses lointaines les fils des habitants.

Le plan de Talon consistait à former une ligne militaire entre les Iroquois et nous par le moyen de soldats licenciés qui deviendraient cultivateurs et, en cela, il disait se modeler sur les Romains. C'était, en effet, tellement romain qu'il ne fut pas capable de l'exécuter. Le climat du nord, la neige, la forêt, les grandes distances d'un lieu à un autre, la pénurie des ressources en tous genres, ne ressemblaient pas aux admirables pays en pleine culture dont les soldats de la République massacraient les habitants et prenaient les fermes prospères. Louis XIV voulait établir le système féodal: des censitaires ayant pour chefs des seigneurs moitié civils moitié militaires, comme les Saxons de Clovis, mais il ne prit jamais la peine de traduire sa pensée dans le sens pratique. Clovis, arrivant au Poitou avec ses bandes de cultivateurs-soldats, avait enlevé les plus belles terres aux Latins et s'y était installé. C'était une civilisation qui, le sabre à la main, remplaçait l'ancien ordre civilisé. Quel rapport ces choses pouvaient-elles avoir avec le Canada sauvage ?—aucun.

VIII

Un mot, une digression au sujet du régiment de Carignan, pour lui dire adieu. Sa rentrée en France, sa troisième ou quatrième réforme, puis la guerre de Hollande sont les premières choses à remarquer. Le 6 avril 1672, Louis XIV dénonçait aux Provinces-Unies l'ouverture des hostilités et, bientôt après, il s'avança avec 130,000 soldats. Le 16 mai il écrivait au comte de Frontenac, nommé gouverneur du Canada, l'instruisant de cette démarche. Le 12 juin eut lieu le célèbre passage du Rhin.

Il nous a été impossible de suivre le régiment qui nous intéresse, à travers cette campagne et bien d'autres. Le P. Daniel, notre seul guide en cela, est peu précis et nous ne l'avons deviné qu'à l'aide d'autres sources—encore y est-il plutôt question du chef que des soldats :

" Au prince de Carignan succéda le comte de Soissons, au comte de Soissons le marquis de Lignerac, et puis M. de Cotteron et M. de Cebret." La colonelle de Salières y était toujours avec son drapeau blanc et avait pour capitaine M. de Salières, fils de celui qui avait été colonel du régiment en Canada. En 1714, sur la liste des régiments d'infanterie, M. de Cebret est porté à la tête du régiment du Perche, nom que le régiment de Carignan avait pris sous M. de Lignerac, vers

1700. Le successeur de ce dernier, M. de Cotteron, ayant été tué en 1707, au combat de Turin, on peut penser que le régiment était alors avec lui. Au mois d'octobre 1718, le régent fit consentir M. de Salières à ne plus porter le drapeau blanc dans sa compagnie, laquelle il lui conserva, le dédommageant par un brevet de colonel.[105]

Le prince Eugène-Maurice de Carignan, de la famille de Savoie, fut induit par sa mère, qui appartenait à la maison de Bourbon, à épouser (1656) Olympe Mancini, nièce de Mazarin, et ce dernier fit revivre pour le prince le titre de comte de Soissons, de sorte que Olympe est toujours citée comme " comtesse de Soissons " ou encore " madame la comtesse " tout court. Elle dominait absolument son mari. On a rendu celui-ci assez ridicule en prétendant que Molière a pris de lui le mot de M. Jourdain qui s'étonne de faire de la prose. " C'était d'ailleurs, dit un biographe, un brave militaire qui avait fort bien servi ; il s'était signalé à la bataille des Dunes (1658) sous Turenne et y avait culbuté l'infanterie espagnole, à la tête des Suisses qu'il commandait. Il fut envoyé en embassade extraordinaire au couronnement de Charles II (1661), et il se battit en duel avec un lord qui avait mal parlé du roi de France. Il fit les campagnes de Flandres et de Hollande (1667, 1672) et fut un des plus braves au passage du Rhin. Il allait rejoindre l'armée de Turenne en Allemagne quand il mourut (1673) assez subitement ".[106] Olympe lui avait donné trois filles et cinq fils dont l'un, né à Paris en 1663, fut le fameux prince Eugène, allié de Marlborough, qui pesa si cruellement sur les destinées de la France à la fin du règne de Louis XIV. Ce monarque avait été élevé avec Olympe et il l'aimait ; les coups que lui portait le fils devaient être pour lui doublement sensibles—mais la mère avait encouru la disgrâce de son ancien amant, de sorte que la conduite du prince Eugène ressemble fort à la vengeance. " Rien n'était pareil, observe le duc de Saint-Simon, à la splendeur de la comtesse de Soissons, de chez qui le roi ne bougeait, avant et après son mariage, et qui était la maîtresse de la cour, des fêtes et des grâces ". En 1679-80, elle tomba sous des intrigues de cour et se sauva à l'étranger. Colbert, fidèle au souvenir de Marazin, avait protégé ses nièces; Louvois, ennemi de Colbert, persécuta Olympe ; " il la poursuivit jusque dans les enfers ", selon les termes de l'abbé de Choisy. Elle erra vingt-huit ans hors de France et mourut à Bruxelles en 1708, âgée de 68 ans, au moment des plus grandes victoires de son fils.

Parmi les corps français d'où l'on tira des détachements pour les envoyer en Amérique, au secours de Washington (1776-78) il y avait le 30^e du Perche qui fournit 1,064 hommes. Quatre autres en donnèrent davantage. Le contingent total fut de 25,658 hommes sortis de 34 régiments.[107]

IX

Nous avons expliqué [108] l'origine des coureurs de bois. Ce qui va suivre complète le tableau.

" L'arrivée des troupes introduisit le relâchement dans les mœurs et donna une funeste atteinte à cette simplicité primitive, à cette charité généreuse que nous avons admirées tant de fois et qui, pendant près de trente ans, avaient fait comme le caractère particulier de Villemarie. En envoyant le régiment de Carignan dans son entier, sans choisir les soldats et les officiers, on devait semer et on sema en effet l'ivraie parmi le bon grain. Quelques-uns des chefs militaires furent même un grand sujet de scandale. . . Les exemples scandaleux de La Frédière et notamment son trafic illicite avec les sauvages, trouvèrent un trop grand nombre d'imitateurs parmi les officiers des troupes, et eurent, pour toute la colonie, les plus tristes résultats. Ces militaires devenus trafiqueurs, songeant avant tout à leurs intérêts privés, semblèrent, au lieu de concourir à l'établissement du pays, n'y être venus que pour conspirer sa ruine par le commerce avec les sauvages, à qui ils donnaient des liqueurs fortes en échange de leurs pelleteries. Ils occasionnèrent dans la colonie d'horribles désordres de la part de ces barbares, et les choses allèrent même si loin que plusieurs des habitants des Trois-Rivières, du cap de la Madeleine, de Champlain, crurent devoir en informer le Conseil de Québec. Ils se plaignirent de ce que, malgré les défenses tant de fois réitérées, on envoyait des gens de guerre traiter des boissons enivrantes, aux sauvages, et en si grande quantité, qu'à Villemarie, aux Trois-Rivières, à Champlain, au cap de la Madeleine, à Batiscan, à Sainte-Anne, on rencontrait de ces derniers perpétuellement ivres, se livrant aux désordres les plus monstrueux que pouvait produire l'ivresse dans ces barbares. Ils ajoutèrent que ces gens de guerre, non contents de traiter avec les sauvages dans les habitations, les suivaient à la chasse sous divers prétextes, d'où il arrivait que, par leurs ivrogneries continuelles, les sauvages étaient tellement détournés de cet exercice, qu'ils ne rapportaient que le demi quart des pelleteries qu'on eût pu espérer d'eux sans cela." [109]

Par l'arrêt du 10 novembre 1668, il était permis " à tous les Français, habitants de la Nouvelle-France, de vendre et débiter toutes sortes de boissons aux sauvages qui en voudront acheter d'eux et traiter ". [110]

Le terme " tous les Français habitants " paraît avoir été choisi pour désigner les colons, mais il arriva que " les volontaires, les vagabonds et d'autres se crurent autorisés, aussi bien que les habitants ou les colons proprement dits, à vendre des boissons aux Sauvages, ce qui donna lieu à des rixes fâcheuses entre les Français ". [111]

La permission de traiter de la boisson enivrante était restreinte aux habitations des blancs. Défense était faite d'en porter dans les bois, mais il était difficile de faire observer cette règle dans un pays si vaste " où il n'y avait d'autres troupes que les garnisons de Québec, des Trois-Rivières et de Villemarie, si peu considérables qu'à peine suffisaient-elles pour maintenir l'ordre dans ces trois postes. Ainsi, au mois de juillet 1670, M. de Courcelles ayant appris qu'on avait rencontré des coureurs de bois à soixante ou quatre-vingts lieues au-dessus de Villemarie, avait ordonné au juge de ce lieu d'informer contre eux, et au commandant, qui était alors M. de la Motte, de donner main-forte pour les poursuivre et les arrêter; mais que pouvait faire ce commandant avec dix soldats de garnison, pour saisir à une si grande distance des hommes qui formaient entre eux des ligues et marchaient toujours en armes ? Il arriva de là que l'impunité de ces désordres fut cause que le nombre des coureurs de bois s'accrut considérablement." [112]

" Des soldats du régiment de Carignan se mirent dans l'esprit de vouloir courir les bois avec les Iroquois et de les suivre partout dans leurs chasses. Ils se précautionnèrent de beaucoup d'eau-de-vie et partirent sans le dire à personne. Ils avertirent de leur départ quelqu'un de leurs officiers seulement, qui aidait même à les mettre en état de faire ce voyage, dans l'espérance d'y avoir un peu de part. Cinq de ces soldats, qui étaient déjà stylés à ces sortes de voyages, et qui savaient la route de cette rivière et les endroits où les Iroquois avaient coutume de chasser partirent la nuit et arrivèrent à la Pointe-Claire du lac Saint-Louis où ils trouvèrent un Iroquois qui avait son canot plein de peaux d'élans. Ces soldats lui demandèrent s'il ne voulait pas boire un coup d'eau-de-vie ; il répondit que non. Voyant, néanmoins, qu'on lui voulait donner à boire gratuitement et sans intérêt, il accepta l'offre qu'on lui faisait. Cela l'engagea à en boire davantage et, à force de l'exciter, il en but tant qu'il se saoula mort-ivre. Ces soldats, le voyant hors de raison et sans connaissance, lui attachèrent une pierre au col et le jettèrent dans l'eau, [113] au large du lac. Les autres Iroquois, qui avaient fait leur chasse, étant rendus à Montréal, demandèrent, quelque temps après, si on ne l'avait pas vu. On leur dit que non—tellement qu'ils le crurent noyé le long du saut de la rivière des Outaouas. Cependant, quelques sauvages, allant ou revenant de la chasse, aperçurent un corps flottant sur l'eau, soit que la corde qui servait à lui attacher la pierre au col fut rompue ou qu'elle ne fut pas assez pesante. Ils furent droit vers ce corps et reconnurent celui dont on ne savait point de nouvelles. Ils le transportèrent à Montréal et, dans les plaintes qu'ils firent, ils représentèrent que, dans leurs chasses, il n'y avait pas eu d'autres sauvages qu'eux et, par conséquent, il n'y avait que des Français qui pouvaient avoir tué leur camarade. On fit d'exactes recherches pour découvrir les auteurs de cette action, sans pouvoir réussir. Les soldats, après avoir fait ce coup, apportèrent nuitamment les pelleteries chez leur officier et lui firent accroire qu'ils les avaient traitées avec des Iroquois qui étaient retournés à la chasse. Cet officier en donna en payement à quelqu'un, car c'était l'usage de s'en servir au lieu de monnaie dans le pays. Celui qui les avait eues de cet officier les avait aussi données à quelque autre et, de cette manière, elles étaient passées en plusieurs mains. Il arriva qu'un Français en ayant une, la porta chez un marchand où se trouvèrent présents des Iroquois, qui la reconnurent par la marque différente que chacun d'eux met à sa pelleterie. Ils la saisirent pour la porter sur le champ au commandant de la ville. On fit venir le Français, qui fut questionné pour savoir de qui il avait eu cette peau. Il nomma la personne qui la lui avait donnée. On la fit appeler ; elle nomma aussi celle dont elle l'avait reçue, et on reconnut par ce moyen qu'elle était venue en premier lieu de la maison où demeurait l'officier. On y fouilla, et plusieurs peaux de la même marque s'y trouvèrent qui furent reconnues appartenant à ce sauvage assassiné. Ces preuves ne laissèrent plus de doute qu'il avait été tué par des soldats. Ces soldats, dans ce temps-là, étaient partis derechef pour traiter de l'eau-de-vie dans la rivière des Outaouas, après avoir remboursé l'officier de la première avance et de la dernière qu'il leur avait faite, pour le reste du butin de l'Iroquois qu'ils avaient assassiné. Il fut ordonné à l'officier de les arrêter aussitôt qu'ils seraient de retour, ou d'avertir afin de les punir et de rendre justice aux Iroquois—car on les entendait déjà murmurer. Ils donnaient à connaître que leur indignation était assez grande pour renouveler la guerre, si on avait manqué de leur faire raison de cet assassin.[114] Les auteurs de cet assassin n'ayant point de retraite plus assurée que chez leur officier, arrivèrent la nuit chez lui où ils furent arrêtés et mis en prison. Le conseil de guerre s'étant assemblé pour les juger, ils avouèrent, dans les premières interrogations, le crime dont on les accusait et furent condamnés, tous les cinq, à être passés par les armes, en présence des Iroquois. On les fit conduire et attacher, tous les cinq, chacun à un pôteau. Les Iroquois s'étonnèrent de l'ample justice qu'on leur rendait et demandèrent grâce pour quatre, parce que n'ayant perdu qu'un homme, il n'était pas juste, disaient-ils, d'en défaire cinq, mais un seulement. On leur fit comprendre que les cinq étaient également criminels et méritaient sans exception la mort. Les Iroquois, qui ne s'attendaient pas à une satisfaction si étendue, redoublèrent leurs instances pour obtenir la grâce de quatre et firent pour ce sujet des présents de colliers de porcelaine, mais on ne les écouta pas et on les passa tous les cinq par les armes."[115]

Frontenac écrivait à Colbert, le 2 novembre 1672 : " Il faudrait envoyer ici quelques troupes, qui seraient très nécessaires pour maintenir ce pays en repos, en empêchant les désordres des coureurs de bois qui, si l'on n'y prend garde, deviendront comme les bandits de Naples et les boucaniers de Saint-Domingue. Leur nombre s'augmente tous les jours, nonobstant toutes les ordonnances qu'on a faites, et que j'ai encore renouvelées, avec plus de sévérité qu'auparavant. Leur insolence, à ce qu'on m'a dit, va au point de faire des ligues et de semer des billets pour s'attrouper, menaçant de faire des forts et d'aller du côté de Manate et d'Orange, où ils se vantent qu'ils seront reçus et auront toute protection."

X

Le lecteur demande des explications—toujours. Les détails nous manquent, qu'importe ! il faut qu'on explique. Chaque fois qu'il s'agit du régiment de Carignan, les opinions étant indécises, on insiste, néanmoins, pour avoir un exposé clair et précis de toute la substance. Comment le donner puisque les pièces essentielles font défaut ?

Les neuf paragraphes qui précèdent devraient suffire, à la rigueur, pour l'acquit de notre tâche, cependant un point n'a pas été mis en lumière, savoir : les noms des officiers du régiment et même, si possible, des notes sur chacun d'eux.

Il n'y a pas de liste connue de ces hommes. C'est avec patience et longueur de temps que nous en avons retrouvé un certain nombre ; peut-être en avons-nous assez pour comprendre le rôle qu'ils jouaient, du moins en ce qui concerne le parti resté en Canada. On peut les classer comme suit :

Tués en Canada.

D'Aiguesmortes périt dans la retraite, à la fin de février 1666, avant que d'avoir traversé le lac Champlain.

En juin 1666, furent tués près du fort Sainte-Anne, au lac Champlain : Chasy, Marin, Chamat, Montagny et le capitaine Traversy. Comme il n'est fait mention que de trois officiers, nous croyons que Chasy, Marin et Traversy étaient ces personnes ; alors Chamat et Montagni deviendraient des surnoms appartenant à deux d'entre eux.

Le lieutenant Du Luques ou De Luc périt durant la marche de retour, l'automne de 1666. Un officier du nom de De Chaulny fut tué par les Iroquois (L'abbé Daniel: *Quelques contemporains*, p. 34.)

Repassés en France, ou dont la trace se perd après 1668.

Beaubel, officier volontaire; Salampar; Sauvole; De Saint-Nicolas; François de Sainte-Croix, lieutenant de la compagnie de Sidrac Dugué; Dugal ou Dugas; l'enseigne Darienne, commandant une escouade au fort Sainte-Anne en 1666; le lieutenant François Feraud, premier aide-de-camp; le capitaine Fromont; Valentin Frapier, sieur de Beauregard, lieutenant; le sieur Flottant, chevalier de Lescure; capitaine Maximin; Mignardet, lieutenant de la compagnie colonelle; François de Montail, sieur de Clérac, capitaine au régiment du Poitou; capitaine La Fouille, oncle de Philippe Gauthier de Comporté; capitaine de Latour; Nicolas de Choisy, cadet de la compagnie Maximin; Prudent-Alexandre Taboureau de Véronne, enseigne de la compagnie Berthier; capitaine Rougemont, commandant au fort Sainte-Thérèse en 1666; Jean Nicolas, sieur de Brandis, enseigne; Jean Laumonier, sieur de Traversy, enseigne au régiment d'Orléans.

Le chevalier Alexandre de Chaumont, né vers 1640, était maréchal des camps et armées du roi. Il a dû retourner en France l'automne de 1666. En 1685 on l'envoya embassadeur auprès du roi de Siam.

A Québec, le 22 novembre 1667, au mariage de J.-B. Morin dit Rochebelle, qui devint membre du conseil supérieur de Québec, était présent " Louis De Canchy, sieur De Lerolle ". Le *Journal des Jésuites* note que " M^r de Lerolcs était cousin de Monsieur de Tracy ", Nicolas Perrot dit que " M^r de Noirolle, neveu de M^r de Tracy " était prisonnier des Iroquois au commencement de l'été de 1666. Il retourna à Québec et repassa en France.

Le capitaine Isaac Berthier, du régiment de l'Allier, servant auprès de M. de Tracy, était à Québec le 12 août 1665, témoin du mariage d'Henri Brault. Est-ce lui qui repassa en France vers 1669, d'après l'abbé François Daniel ? Oui, probablement. [116]

En 1667, était garde-magasin à Québec, Nicolas Grisard, sieur des Ormeaux. Le 5 décembre, même année, à Québec, Roch Thoery, sieur de l'Ormeau, natif de Saint-André de Gailac, diocèse d'Alby en Languedoc, lieutenant au régiment de la reine, épousait Marie-Rogère Le Page, de Saint-Martin de Clammecy, diocèse d'Autun, en Bourgogne.[117] Il est mentionné aussi comme enseigne de la compagnie de M. Dugué. On peut lire dans Faillon, III, 393-96, le curieux récit de l'attaque à main armée dont il fut l'objet, à Montréal, en 1671, de la part de deux officiers, de Morel et Carrion. Les personnes présentes étaient madame de l'Ormeau, Picoté de Belestre, Charles Le Moyne de Longueuil, deux prêtres, MM. de Casson et Frémont, un marchand de la Rochelle nommé Baston, un domestique appellé Gilles. Nous ne connaissons pas la suite de la carrière du sieur de l'Ormeau, sauf qu'il était décédé avant 1681, d'après le recensement de Québec cette année.

Aumôniers.

Messire Flavien de Saint-Pons, prêtre, appelé l'abbé de Carignan, était aumônier du régiment. Il est cité aux Trois-Rivières, en mai 1666, et résidait à Chambly l'automne de 1667 ; paraît être retourné en France l'année suivante. [118]

L'abbé Jean-Baptiste Dubois d'Egriseilles, arrivé le 19 août 1665, avec M. de Salières, accompagna l'armée l'automne de 1666 et faillit périr de misère. En octobre 1667, il était résident au fort de Chambly ; en mai 1671, on le voit aux Trois-Rivières ; en juillet 1674, il figure à Montréal. Son départ pour la France paraît avoir eu lieu en octobre 1680. [119]

Le père Thierry Beschefer, jésuite, arrivé à Québec le 19 juin 1665, avec des compagnies du régiment de Carignan, se rendit jusqu'aux Trois-Rivières où les soldats devaient tenir garnison, mais atteint d'une fièvre continue, il retourna à Québec le 14 octobre suivant. Il alla comme missionnaire chez les Agniers en 1670. On le trouve supérieur du collège de Québec durant plusieurs années, puis il passa en France. En 1691, il s'embarqua pour revenir, mais il paraît qu'il ne séjourna pas longtemps dans la colonie et s'en retourna en France. [120]

Passés en Acadie.

Hubert d'Andigny de Grandfontaine, capitaine au régiment du Poitou, puis à celui de Carignan, s'était vite familiarisé avec la vie des bois et la guerre des sauvages. Vers 1669 il obtenait le grade de major. Le 5 mars 1670, furent rédigées, " pour le chevalier de Grandfontaine ", des instructions afin d'aller commander en Acadie et solliciter " auprès des officiers de Sa Majesté Britannique, commandant à présent au dit pays ", la restitution des terres, places et seigneuries qui devaient être remises au roi de France en vertu du traité de Bréda fait en 1667. En 1670 partirent donc de Québec une trentaine de soldats, le capitaine de Chambly, le lieutenant Marson de Joybert de Soulanges, l'enseigne de Villieu et l'enseigne Vincent de Saint-Castin, sous les ordres de Grandfontaine. Les Anglais rendirent immédiatement le Maine, le sud du Nouveau-Brunswick, la Nouvelle-Ecosse, le pays des Maléchites et baie des Chaleurs, les îles Saint-Jean et du cap Breton. En 1673 Grandfontaine étant rappelé en

France, ce fut Chambly qui le remplaça. Grandfontaine reprit la direction des affaires en 1682.[121]

Le capitaine Jacques de Chambly érigea le fort Saint-Louis sur la rivière Richelieu, l'été de 1665, et y resta commandant. Il prit part aux expéditions contre les Iroquois en 1666. La seigneurie du fort Saint-Louis (Chambly) lui fut accordée le 29 octobre 1672 ; l'acte porte : " capitaine au régiment de Carignan et commandant les troupes en Canada ". Le comte de Frontenac venait d'arriver dans le pays. Il avait nommé M. de Chambly " commandant de toutes les habitations depuis la Rivière du Loup (Châteauguay) à celle de Saint-François (du Lac) jusqu'au Long Saut (sur l'Ottawa), à l'exception de l'île de Montréal ". Frontenac ajoute que l'habitation du fort Saint-Louis, où réside cet officier, est la plus jolie de tout le Canada. C'est vers cette date, croyons-nous, que Chambly épousa M^{lle} de Thauvenet dont la sœur aînée était mariée à François Hertel, sieur de Lafrenière. Le régiment de Carignan était alors repassé en France. M. de Chambly reçut le grade de capitaine dans le détachement d'infanterie que le ministère de la marine entretenait parmi nous et que l'on appelait improprement " troupes de la marine ", puisqu'il ne renfermait pas de marins. En 1673 M. de Chambly commandait à Pentagoët sur la côte du Maine et, l'année suivante, attaqué par un corsaire hollandais, il reçut une blessure grave, le poste se rendit, son commandant fut rançonné, selon la coutume des écumeurs de mer. Peu après, M. de Grandfontaine partant pour la France, notre officier devint gouverneur de l'Acadie où il resta jusqu'à 1679, étant alors envoyé à la Grenade, ensuite à la Martinique où il mourut dans cette dernière fonction. Ses appointements lui étaient payés en sucre, principal produit de l'île. Sa femme lui survécut. Il paraîtrait que, un jour, ayant fait fouetter un nègre qui ne lui appartenait pas, elle reçut une réprimande du ministre des colonies, comme on le voit dans une dépêche que M. J.-O. Dion nous a montrée. Le fief de Chambly passa, après sa mort, à son neveu René Hertel, qui prit l'habitude de signer " Chambly ", et qui fut tué dans la campagne de 1708 contre les provinces anglaises.

Pierre de Joybert, sieur de Marson, né vers 1644 à Saint-Hilaire de Soulanges en Champagne, était lieutenant de la compagnie de Grandfontaine au régiment du Poitou et fit la guerre de 1666 avec le régiment de Carignan contre les Iroquois. En septembre 1668, il paraît être revenu de France mêlé à une affaire de marchandises et à des bagarres qui auraient eu lieu sur le navire la *Sainte-Anne* durant la traversée ; il y est fait mention principalement de barriques de vin. Le sieur de Joybert commençait probablement alors son métier de trafiquant de fourrures. Au mois de septembre 1670, le chevalier de Grandfontaine reçut du capitaine Walker le fort de Pentagouet à titre de gouverneur français de l'Acadie, et Joybert de Marson, agissant comme major, prit possession de Port-Royal et de Jemsec sur le fleuve Saint-Jean. En novembre 1671, Talon écrit que Joybert est de retour à Québec, après s'être brouillé avec Grandfontaine. Le 17 octobre 1672, à Québec, Joybert [122] épousa Louise Chartier de Lotbinière ; le 20 du même mois, Frontenac lui concéda la seigneurie de Jemsec sur le fleuve Saint-Jean et l'envoya commander le fort de ce lieu où il y aura, dit-il, 9 hommes de garde fournis par Grandfontaine. Le 18 août 1673, naquit à Jemsec Louise-Elizabeth qui fut baptisée à Québec le 15 juin 1675, et se maria, en 1690, avec le marquis de Vaudreuil, qui devint gouverneur général de la Nouvelle-France. Au mois d'août 1674, un corsaire hollandais qui avait passé par Boston, attaqua le fort de Pentagouet où M. de Chambly fut blessé grièvement et pris ; ensuite il enleva de Jemsec M. de Joybert et fixa sa rançon à mille peaux de castor. En apprenant cette nouvelle, vers la fin de septembre, le comte de Frontenac envoya un canot pour ramener à Québec madame de Joybert abandonnée dans les bois du Nouveau-Brunswick. Son mari se libéra, on ne sait quand, mais ce fut en 1676 au plus tard, d'après l'acte de baptême de son fils Pierre-Jacques qui porte la date du 8 juillet 1677 à Québec. Dès l'été de 1676, Frontenac écrivait que Joybert et sa famille retournent à Jemsec. Une note du roi, en mai 1678, constate que Joybert est commandant en Acadie ; c'est l'année même où cet officier mourut. Il faut croire que sa veuve continua le commerce, car en 1682 il est fait mention des pelleteries qu'elle avait à Jemsec ; en même temps elle sollicite de l'aide du roi et Colbert l'inscrit pour une pension de 600 livres par année, laquelle fut supprimée, à la mort du ministre. L'automne de 1685, Denonville écrit que la pauvre femme est à Québec, dénuée de tout avec ses enfants. Seignelay accorde une pension de 300 livres. En 1691 le titre de la seigneurie de Jemsec reçut nouvelle confirmation du gouverneur, puis du roi deux ans plus tard, ce qui ne pouvait être utile que pour le commerce des fourrures. Le fils, Pierre-Jacques, se fit donner une terre, en Canada, aux Cascades, [123] qui prit le nom de Soulanges.

L'enseigne Vincent d'Abadie, sieur de Saint-Castin, originaire du pays basque, appartient complètement à l'Acadie, où il a joué le rôle d'un héros de roman et laissé des souvenirs multiples. De simples notes comme celles-ci ne pourraient que le défigurer ou le laisser incomplet devant l'histoire, si nous tentions d'examiner sa carrière.

Claude Villieu et sa descendance avaient été anoblis par Emmanuel, duc de Savoie, en 1628, puis, comme les circonstances l'obligèrent plus tard à changer de pays, il se fixa à Beaumont-sur-Mer et obtint d'enregistrer ses lettres patentes à Poitiers en 1662. Son fils, Claude-

Sébastien le Bassier de Villieu, sieur de Daudeville, signait au contrat de mariage d'Henri Brault, le 12 août 1665, à Québec. Il est qualifié de volontaire et enseigne au régiment de Carignan, aussi de lieutenant de la compagnie Berthier. Vers 1667 il demanda la permission de faire un voyage en France et s'y maria, à Nantes, paraît-il, avec Jeanne-Marie Le Breton. Au mois de juin 1668 le roi accorda au père des lettres de naturalisation. Notre officier ayant "vendu tout son bien pour le transmettre en Canada avec toute sa famille", il est dit dans une plainte au Conseil Souverain que ceux qui ont le monopole du commerce ont "refusé le passage de ses effets, ce qui l'a obligé de demeurer en l'ancienne France, de même qu'un chirurgien de Montréal qui a été obligé de prendre la route des Iles (Antilles) plutôt que celle du Canada parce que on lui a refusé d'y passer ses effets". La présence de ce ménage est signalée à Québec le 26 septembre 1671, par la sépulture d'une fille née en 1668 ou 1669. Peu après, Villieu fut envoyé en Acadie, mais avec le dessein de revenir puisqu'il reçut en 1672 la seigneurie appelée plus tard du nom de M. Le Gardeur de Tilly. Villieu s'étant tout à fait acclimaté en Acadie, la terre en question fut reprise par l'intendant et concédée à une autre personne en 1684. Madame de Villieu était encore à Québec ou dans les environs, en 1675 et elle occupait une maison appartenant à Pierre Niel, exploitait une pêcherie, faisait en même temps enregistrer les lettres de noblesse de son mari. Il est probable qu'elle ne tarda guère à partir elle aussi. De ce moment jusqu'à 1704, on voit Villieu agir comme militaire sous les gouverneurs de Port-Royal; il eut une carrière mouvementée, monta en grade, subit la disgrâce du roi, reprit ses fonctions, fut accusé de faire le commerce, se brouilla avec ses chefs, fut pris par les Anglais, retourna à la tête de sa compagnie, reçut un fief, revint major de l'Acadie, fut de nouveau interdit, et finalement on lui donne 600 livres de pension. Son fils Sébastien, marié à Judith Le Neuf de la Vallière (1692), a été un officier militaire de distinction.[124]

Le capitaine Louis Petit, natif de Normandie, vers 1625, fut ordonné prêtre à Québec le 21 décembre 1670, se voua aux missions des Abénakis, fut nommé vicaire-général en Acadie le 5 septembre 1676. Il résidait à Port Royal d'où les Anglais l'enlevèrent à la prise de cette place en 1690. Il revint l'année suivante, mais ne put rentrer dans son ancienne position et alla demeurer à Québec où il mourut en 1709.[125]

Ont été militaires, traiteurs, gouverneurs.

Thomas-Xavier Tarieu, sieur de Lanaudière et de la Pérade, enseigne dans la compagnie de Saint-Ours, né en 1644, à Notre-Dame de Mirande, diocèse d'Auch, en Gascogne, épouse à Québec, le 16 octobre 1672, Marguerite-Renée Denys de la Ronde, canadienne. Quelques jours plus tard, il obtient, de concert avec Edme Le Sueur, la seigneurie de Sainte-Anne de la Pérade, s'étendant depuis les Grondines jusqu'à la rivière Sainte-Anne, comprenant le morceau de terre acheté par eux du sieur Louis Hamelin, seigneur des Grondines. Le 10 février 1674, Tarieu est nommé gouverneur de Montréal par suite de l'emprisonnement de François-Marie Perrot, et il garde cette place jusqu'au retour de ce dernier en juillet 1675, sinon plus tard. Sa fille Louise naquit à Montréal en 1674 ; un autre enfant, Louis, fut baptisé à Québec en juin 1676, lequel se noya dans la rivière Sainte-Anne vers 1690. Un autre garçon, Pierre-Thomas, baptisé à Québec le 12 novembre 1677, fut le continuateur de la famille. Tarieu demeurait à Sainte-Anne, croyons-nous, tout en étant capitaine des gardes du gouverneur. Au mois d'avril 1680 il est mentionné comme défunt et sa veuve demande certains règlements d'affaires avec Edme Le Sueur qui paraît être absent—peut-être était-il déjà dans l'ouest.[126]

Le lieutenant, René Gaultier de Varennes marié en 1667 à Marie Boucher, canadienne, fut gouverneur des Trois-Rivières depuis cette date jusqu'à 1689, où il mourut. Il exploitait le commerce de fourrures du Saint-Maurice. De concert avec Pierre Boucher, son beau-père, il commença la seigneurie de Varennes et y comptait une trentaine de pauvres habitants mais sans aucun travail de culture pour lui-même. Son fils, La Vérendrye, a été militaire et traiteur; on lui doit la découverte du nord-ouest ; malgré cela, il mourut sans fortune, comme son père, comme Tarieu de Lanaudière et autres qui ne furent pas des habitants.

Militaire et gouverneur.

Noble homme Pierre de Saint-Paul, sieur de la Motte-Lussière, capitaine au régiment de Carignan, construisit le fort Sainte-Anne à l'entrée du lac Champlain (1666) et, vers la fin de 1668, il remplaça Zacharie Dupuis, commandant à Montréal. Comme il était à ce poste, "homme de cœur et d'honneur, sa compagnie était la seule du régiment de Carignan restée dans le pays", observe Nicolas Perrot au sujet d'événements qui se passaient l'été de 1669. De bonne heure, l'été de 1670, il partit pour la France, laissant La Fredière à sa place. Jusque-là, il avait attendu l'arrivée de François-Marie Perrot, nommé gouverneur de Montréal mais qui se trouva retardé d'un an par suite des périls de la navigation. Perrot étant débarqué à Québec avec Talon son parent, le 18 août 1670, on suppose qu'il releva La Fredière de ses fonctions vers le 1er septembre. En tous cas, Pierre de Saint-Paul, sieur de la Motte-Lussière, ne revint pas dans la colonie. On ne doit plus le confondre avec les quatre personnages suivants, comme cela est arrivé plus d'une fois: 1° Jean Deleau, sieur de la Motte qui commandait à Chambly en 1677; 2° Dominique de la Motte-Lussière, venu de France avec Cavelier de la Salle en 1678, marié à Montréal en 1680, seigneur de la Lussaudière en 1683, décédé à Montréal en 1700; 3° Claude de la Motte, marquis de Jourdis ou Jordis, marié à Lachine en 1685, tué par les Iroquois en 1687; 4° Louis de la Rue, chevalier de la Motte, lieutenant dans les troupes entretenues en Canada, tué par les Iroquois, à Saint-François-du-Lac, en 1690.

Fonctionnaire.

Le sieur Randin, enseigne de la compagnie de M. de Sorel, commandait en 1671 un navire qui revenait de Pentagouet, d'après les ordres de Talon. Le 29 octobre 1672, on lui accorda une demi-lieue de terre au fleuve Saint-Laurent sur une lieue de profondeur, depuis la concession de Gauthier de Comporté jusqu'aux terres non concédées ; le même jour, il passa le titre de ce fief au capitaine Berthier. Une des îles de Berthier-en-haut se nomme encore Randin. C'est lui qui traça le plan du fort de Cataracoui et en dirigea la construction, l'été de 1673. Une " carte de l'Amérique Septentrionale ", restée manuscrite au dépôt des archives de la marine, à Paris, " dressée par Randin en 1689 " est plutôt de 1678. Harrisse observe que " Randin, ingénieur, et l'obligé du comte de Frontenac, nomme le Mississipi Rivière de Buade, et les pays avoisinants Frontenacie." Cavelier de la Salle écrivait, le 22 août 1682, pour se plaindre des coureurs de bois, et il dit que Randin qui est décédé, allait, par ordre de Frontenac, inviter les Sioux à se rendre à Montréal. [127]

Fonctionnaire et traiteur.

Philippe Gauthier, sieur de Comporté, mérite une attention spéciale car il représente à lui seul presque tous les caractères sortis du régiment de Carignan au Canada. Né en 1641 dans un bourg du Poitou, il avait le goût des aventures avec des aptitudes pour le commerce, ce qui paraît l'avoir décidé à se faire soldat dans la compagnie de son oncle, le capitaine Lafouille, qui tenait garnison au lieu nommé la Motte-Saint-Héray, près de Parthenay en Poitou. Un soldat appelé

Lanoraye, battant la caisse aux coins des rues et carrefours pour raccoler des recrues, se plaignit à ses camarades que le sieur Jacques Bonneau-Chabot, juge, sénéchal civil et criminel du marquisat de la Motte Saint-Heraye,[128] l'avait maltraité et lui avait enlevé son tambour. On décida de venger cet affront et, par conséquent, vers huit ou neuf heures du soir, Comporté avec six ou sept hommes de la même compagnie, se rendirent auprès de Bonneau qu'ils rencontrèrent comme il venait de souper, ainsi que sept ou huit personnes armées d'épées. Il y eut combat immédiatement. Le juge Bonneau et l'un de ses suivants, appelé Jean Baugier de la Thibaudière, furent blessés à mort. L'affaire ayant été instruite devant le siège royal de Saint-Maixant, en février-avril 1665, la sentence de mort contre Comporté fut prononcée le 10 mai—alors que le régiment était en route pour le Canada. L'oubli s'empara de ce drame qui ne paraît pas avoir été révélé au débarquement des troupes à Québec. De simple soldat qu'il était en 1664, Comporté était devenu officier au titre de volontaire, d'après une liste de 1669 que M. l'abbé François Daniel a publiée en 1867. L'intendant Talon lui confiait la charge importante de commissaire général des vivres. Dans une pièce du 1^er^ septembre 1670, il est qualifié de "commis à la recette du dix pour cent", et, comme tel, confisque les marchandises venues de la Rochelle à l'adresse de (Paul ?) Dupuis et qui ont été emmagasinées chez Eustache Lambert sans payer le dix pour cent. Le 18 octobre 1673, il agit comme procureur de Jean Talon, l'ancien intendant, au cours d'un procès contre Pierre Dupas, à propos de la traite des pelleteries. Le 9 avril suivant, il figure dans les registres du même tribunal au sujet d'un billet signé par les nommés Perrot et Derby, pour des affaires de commerce. En 1675 on le voit marguiller de la paroisse de Québec. Il était alors en possession d'un fief d'une demi-lieue au fleuve sur une lieue de profondeur que Talon lui avait accordé le 10 octobre 1672; c'est une terre située au-dessus de Berthier-en-haut et qui est connue sous les noms de Comporté, Antaya, Dorvilliers, d'après ses propriétaires successifs. Le 22 novembre 1672, Philippe Gauthier de Comporté se mariait à Québec, avec Marie, sœur de Charles Bazire, l'un des principaux marchands de la colonie. L'automne de 1675, il vendait son fief de Comporté à François Pelletier dit Antaya et à François Chorel dit Saint-Romain, toutefois il ne parait pas s'en être désaisi, faute par les acheteurs d'avoir rempli certaines obligations. Plus tard le fils de Pelletier devint acquéreur de la part de Chorel fils, surnommé Dorvilliers, de sorte qu'il traita avec les héritiers du sieur Gauthier de Comporté (vers 1700) et prit possession de tout le fief. En 1677 le roi créa une cour de prévôté à Québec et y plaça dans la charge de juge Philippe Gauthier de Comporté, lequel paraît s'être retiré du commerce pour occuper ce poste, mais il conservait des intérêts dans la traite des pays d'en haut. Par prudence, il avait sollicité des familles Bonneau et Baugier le pardon des deux homicides de 1665, et l'ayant obtenu sous forme de déclaration empreinte de sentiments chrétiens, signée par les principaux membres de ces familles, il invoqua la clémence du roi qui ne lui fit pas défaut. Ces pièces furent enregistrées au Conseil Souverain de Québec, l'été de 1681, après des séances solennelles dont le compte-rendu présente une étude curieuse. Gauthier de Comporté et sa femme moururent l'automne de 1687. De leur onze enfants il en survivait sept, dont deux filles entrées en religion, deux mariées et trois garçons qui ne paraissent pas avoir laissé de descendance. Les cinq derniers se partagèrent vingt mille francs qui restaient à la famille, une fois les dettes payées.[120]

Ont fait la traite de l'eau-de-vie et n'ont pas colonisé.

Les sept ou huit personnages qui vont maintenant nous occuper furent les auteurs de la déplorable engeance connue sous le nom de coureurs de bois. Quatre autres les ont secondés dans cette œuvre, savoir: Gaultier de Varennes, Gauthier de Comporté, Pierre de Sorel et Sidrac Dugué. Nous ne parlons pas des Canadiens qui en ont fait autant: Boucher, Lebert, Rolland, Lachesnaye, etc.

Edme Le Sueur, lieutenant au régiment de Carignan, et Thomas Tarieu de Lanaudière, enseigne au même corps, obtinrent ensemble la seigneurie de Sainte-Anne de la Pérade par un titre du 29 octobre 1672. Au recensement de 1681, Le Sueur est le premier inscrit en ce lieu: " Edme Sueur, 50 ans, 3 fusils." Cette même année fut emprisonné à Québec, pour avoir traité au saut Sainte-Marie, Pierre-Charles Le Sueur dit Dagenais, natif de Notre-Dame de Héden en Artois ; cet homme se maria en 1690, à Boucherville, et demeura à Montréal; il est qualifié d'interprète. Etait-il parent de Edme Lesueur ? car ce dernier fut aussi un "voyageur des pays d'en haut." En 1683 Edme était au lac Pepin sur le Mississipi. Lorsque Nicolas Perrot prit possession du Haut-Mississipi, en 1689, Lesueur était présent. Vers 1692, celui-ci avait un poste sur l'île Madeleine dans la baie de Chagouamigon, côté sud-ouest du lac Supérieur. Trafiquant au pays des Sioux en 1695-96, il invite les autorités de Québec à s'occuper d'une mine de cuivre qu'il dit avoir trouvée et qui paraît être la même que Dubuque exploita plus tard au-dessous du Wisconsin. M. de Callières dit qu'il n'est pas dupe du trafic illicite caché derrière ces projets d'industrie, et il ajoute, s'adressant au ministre, " toute la traite des pays éloignés n'est que pour le profit de Lesueur, les coureurs de bois, et pour les sieurs de La Forest et de Tonty." Malgré cela, le roi accorda " au sieur Le Sueur permission d'aller fouiller des mines qu'il prétend avoir découvertes sur les bords du Mississipi"—21 mai 1698—mais le 27 mai 1699, ce privilège était retiré. Il est probable que Le Sueur ne l'apprit qu'en 1700, tandis qu'il explorait un affluent de la rivière Chippewa pour y chercher des mines, avec un associé du nom de Penicaut. Dès qu'il eut connaissance de l'arrivée de d'Iberville (son parent) aux bouches du Mississipi il s'empressa de le persuader de la valeur de sa trouvaille et, dans ce but, il descendit le fleuve pour s'entendre avec lui, et d'Iberville le renvoya avec une équipe de vingt hommes pour s'assurer de la mine du pays des Sioux, probablement celle de l'île Royale dans le lac Supérieur. Il n'en résulta rien de bon. En juin 1701 Lesueur fut autorisé à envoyer en France les marchandises qu'il avait à Montréal, pourvu qu'il n'y eut pas de castor mêlé parmi ces effets que Lesueur disait lui être devenus inutiles en Canada. Un mémoire du roi, en date du 14 juin 1704, adressé au gouverneur-général de Vaudreuil, permet à la dame Lesueur d'aller rejoindre son mari à la Louisiane. C'est la seule mention de cette personne que nous ayons vue. Il est fait allusion quelque part à leur fils Louis Lesueur. Les affaires de la Louisiane allant mal, le vieux coureur de bois, épuisé, pauvre, se voyant aux limites de la vie, reparut dans la famille Tarieu de Lanaudière, à Sainte-Anne de la Pérade—c'est là qu'il mourut et fut inhumé le 1er mars 1707.[130]

Pierre Dupas, né en 1637, fils de Jean Dupas et de Jeanne Legendre, de Brache, diocèse de Châlons, en Champagne, avait une cabane de traite, probablement à l'île qui a pris son nom, et où ses marchandises étaient gardées par deux valets : Etienne Clémenceau dit Lachesnaye et Pierre Dupinau, en juillet 1669, lorsqu'ils furent attaqués par trois Soccokis et une sauvagesse de cette nation. Les deux Français tuèrent deux des hommes et la femme. Celui qui s'était sauvé, en emportant divers effets, fut capturé à Sorel. Le 3 novembre 1673, Talon accordait au sieur Dupas, l'île appelée Dupas, avec une île adjacente, de plus, un quart de lieue dessus et autant dessous la rivière du Chicot, sur une lieue et demie de profondeur. Tout ceci n'était qu'un moyen de faire la traite. En octobre 1673, le conseil souverain s'occupa d'une affaire de peaux d'orignal saisies chez Pierre Dupas. Tout démontre qu'il vivait du commerce des pelleteries. Enfin il se maria (1677) et mourut quarante jours après. Il fut inhumé à Sorel. Comme bon nombre de petits traiteurs de l'époque, Dupas obtenait ses articles de fabrication européenne du magasin de Charles Aubert de La Chesnaie, marchand de Québec. Celui-ci prit possession de l'île et des terres à titre de créancier. Le 11 novembre 1690 il vendit le tout moyennant 1,500 livres tournois,[131] à Jacques Brisset, sieur Courchêne et Louis Dandonneau, sieur Dusablé, habitants de Champlain.

Alors seulement commença la colonisation de l'île, par les gens de la côte de Batiscan, Champlain et le cap de la Madeleine.[132] Il est donc faux que Pierre Dupas ait agi comme seigneur: il a fait le trafic des fourrures et pas davantage. La famille Dupas qui existe à présent à Sorel est celle de Charles Brisset, fils de Jacques ci-dessus.

Mentionnons un officier militaire qui, peut-être, se trouvait parent de notre traiteur. En 1672, Louis XIV envahit la Hollande mais il ne put en achever la conquête et se contenta de laisser des garnisons dans les places enlevées par ses armes. Naerden, la ville la plus rapprochée d'Amsterdam, reçut pour commandant le sieur Dupas. L'année suivante, Guillaume d'Orange reprenait l'offensive, la situation des Français en Hollande devint insoutenable. Dupas rendit la ville en septembre. On fit grand tapage de cette capitulation, toutefois les historiens disent que Dupas ne fut blâmé que pour cacher la honte qu'éprouvait Louis XIV du retrait de ses troupes.

Le capitaine de la Fredière, neveu de M. de Salières, était avec sa compagnie à Montréal en mai 1666; l'automne suivant, il commandait en cette ville. " Déjà disgracié par la perte d'un œil, il cachait sous cet extérieur repoussant une âme asservie aux passions les plus avilissantes." Avare, fourbe, tyrannique et débauché, non-seulement il faisait avec les sauvages la traite de l'eau-de-vie, mais encore il les trompait sur la qualité de sa marchandise par des emprunts trop généreux aux vertus de l'inépuisable fleuve Saint-Laurent. Le 1er septembre 1667, M. de Salières se plaignait de ce que La Fredière avait été jugé ou admonesté pour un certain délit par Talon et Courcelles, prétendant que cet officier relevait de son colonel. Le major Zacharie Dupuis commanda l'île de Montréal en 1668, puis le capitaine Pierre de la Motte, de janvier 1669 jusqu'au commencement de l'été de 1670 où il partit pour la France laissant le poste à La Fredière qui l'avait perdu en 1667 par ses excès. Au mois d'août, Talon revenant de France, remplaça le cheval borgne par un aveugle, car si La Fredière n'était pas un saint, le sieur François-Marie Perrot ne valait pas mieux, sans compter qu'il était parent de Talon qui sut le couvrir de sa haute influence, tant à Montréal qu'en Acadie. Nous n'avons plus de trace de La Fredière après 1670.[133] Il fut chassé de la colonie.

Paul de Morel, enseigne de la compagnie de la Motte au régiment de l'Estrade, reçut du sémininaire Saint-Sulpice, le 7 décembre 1671, un fief de 8 arpents de front à la rivière, pointe nord de l'île de Montréal, sur 25 arpents de profondeur, contigu à un fief de pareille étendue accordé le même jour à Philippe de Carrion. Ces deux seigneuries ne tardèrent pas à être flanquées de plusieurs défrichements que des colons, placés par le séminaire, opéraient à la rivière des Prairies. Au mariage de François Lenoir dit Rolland, à Montréal, le 2 janvier 1673, Paul de Morel est présent. [134]

Philippe de Carrion, sieur du Fresnoy, lieutenant de la compagnie de la Motte au régiment de l'Estrade, était probablement du Languedoc où son nom de famille se retrouve. Le 7 décembre 1671, le séminaire de Saint-Sulpice lui accorda un fief sur l'île de Montréal dans la région qui regarde la rivière de l'Assomption, ou bras de la rivière Ottawa. Vers le même temps, il se mariait avec Pétronille des Heures. Leur unique enfant, Jeanne, baptisée à Montréal le 19 septembre 1672, se maria avec Jacques Lemoine de Sainte-Hélène. L'été de 1674, Carrion fut mis aux arrêts à Québec pour avoir favorisé les coureurs de bois sur la partie de l'Ottawa où il trafiquait (à Carillon aujourd'hui ?) et condamné à une amende de 200 livres. Il demeurait alors à Lachine. M. l'abbé Verreau résume une partie du conflit en quelques lignes qui méritent d'être citées : " Le juge de Montréal envoya un sergent arrêter deux fameux coureurs de bois logés chez le lieutenant de Perrot, M. de Carion. La mission n'était pas facile à remplir chez un homme comme M. de Carion qui ne craignait pas d'attaquer ses ennemis l'épée à la main, pendant que madame de Carion allait bâtonner leurs femmes. Le malheureux sergent fut insulté, maltraité et, paraît-il, jeté en prison. M. de Frontenac, apprenant cet outrage fait à la justice, crut qu'il devait intervenir directement, sans égard pour le gouverneur particulier (Perrot) et il envoya le lieutenant de ses gardes, Bizard, arrêter Carion. A cette nouvelle, Perrot fait prendre les armes à sa garnison et court chez M. Le Ber où logeait Bizard, pour punir l'audacieux lieutenant. En vain celui-ci lui montre-t-il un ordre signé du gouverneur-général—Perrot le lui rejetant à la figure : " Reportez-le à votre maître et qu'il apprenne une autre fois à mieux faire son métier ". . . Bizard est traîné en prison avec Le Ber." Ceci amena l'arrestation de Perrot. Le recensement de 1681, ville de Montréal, donne à Carion 52 ans et 40 à sa femme—et 38 arpents de terre en valeur. En somme ce marchand fut, durant une douzaine d'années, l'un des plus ardents propagateurs du commerce de l'eau-de-vie chez les sauvages, défiant les autorités, donnant asile aux criminels et contribuant à créer les bandes de gens qui vagabondaient dans les bois. Sa femme mourut à Montréal en 1682 ; on le cite comme défunt deux ans plus tard. [135]

Antoine Lafrenaye, sieur de Brucy, né en 1649, fils de Martin Lafrenaye et de Geneviève Lepage, de Carlepon, diocèse de Noyon, était lieutenant au régiment d'Auvergne lorsqu'il prit du service dans le régiment en partance pour le Canada. Dès 1670 François-Marie Perrot, gouverneur de Montréal, lui accorda un fief de 10 arpents sur trente à l'île Perrot, vis-à-vis l'île Girdwood à présent, où il commença sans retard un grand commerce d'eau-de-vie avec les sauvages, en société, lui et Perrot, comme on le comprit dans la suite. Ce fut la cause du célèbre procès Fenélon-Perrot-Brucy que l'on voit occupant toute la colonie en 1674-75. Le 2 janvier 1673, au mariage de François Lenoir dit Rolland, marchand de Lachine, furent présents, entre autres, Perrot, gouverneur de Montréal, sa femme, Antoine de Lafrenaye, lieutenant du dit Perrot, Paul de Morel, Philippe de Carrion, sieur du Fresnoy. Ces deux derniers étaient des officiers du régiment de Carignan qui traitaient de la boisson avec les sauvages à la pointe d'en haut de l'île de Montréal—comme aussi Dugué, Chailly, La Joubardière, leurs anciens compagnons d'armes. Le 23 août 1676, Lafrenaye épousa Hélène, fille de Pierre Picotté de Bellestre, marchand de Montréal. Au recensement de Montréal en 1681, on lit: " Antoine de Lafrenaye, 32 ans;[136] Hélène Picotté, 24 ans, sa femme. Enfants : Antoine, 4; Louis, 3; Louise, 1. Domestiques: Simon, 50; Jacques, 30; Madeleine, 17. 2 fusils, 8 bêtes-à-cornes, 60 arpents de terre en valeur." Le même recensement, à Verdun (Lachine) donne : " Antoine de Lafrenaye, 30 ans ; Hélène Picotté, 25 ans ; Pierre, 4 ans ; Louis, 3 ans ; Louise, 10 mois. 2 fusils, 3 bêtes-à-cornes ". Lafrenaye mourut le 30 août 1682 et sa veuve épousa, à Lachine, le 29 octobre 1686, Jean-Baptiste Celoron de Blainville, traiteur au Bout de l'Ile de Montréal. Celoron plaida en 1705 pour retenir possession de l'île Saint-Gilles, située entre le fief Brucy ou Lafrenaye et celui de de Senneville, et prouva que le titre accordé par Perrot à Brucy était postérieur à celui que le séminaire de Saint-Sulpice avait donné à Dugué, de qui Senneville le tenait.[137]

Gabriel de Berthé, sieur de Chailly, né en 1647, " cadet au régiment de Carignan sans un sou de patrimoine, fils d'un père noble, peu riche, demeurant à Amboise ", devint enseigne dans la compagnie du sieur Perrot, gouverneur de Montréal, et, dès 1670, établit un poste de traite sur le fief Bellevue, à la tête de l'île de Montréal, en face de celui de Lafrenaye. Le gouverneur général Courcelles visita ces deux établissements en 1671 à cause des plaintes qu'il avait reçues concernant le trafic des liqueurs. Le 30 juillet 1672, le séminaire de Saint-Sulpice donna le titre de ce fief (400 arpents) " aux frères de Bertet qui le possédèrent en commun, savoir : Louis de Bertet de Chailly et Gabriel de Bertet de la Joubardière, son frère, et M. de la Joubardière le nomma Bellevue ". Il y a souvent confusion entre les noms de ces deux hommes dans les papiers que nous avons examinés. L'automne de la même année 1672, Gabriel subit un procès pour avoir acheté des fourrures d'un Français qui les avait volées à un autre coureur de bois, après l'avoir assassiné. Du mois de mars à la fin d'octobre 1674, Gabriel fut gardien légal des boissons et des marchandises saisies chez Lafrenaye au cours du procès Perrot-Fenélon-Brucy et se trouva pour cette fin à Québec une partie de l'été, à son grand déplaisir. Le 1er janvier 1675, il vendit à Lenoir dit Rolland 40 arpents de terre du fief Bellevue. Ni lui ni son frère ne figurent au recensement de 1681. En 1682 Gabriel plaide contre Lenoir Rolland au sujet d'une coupe de bois et d'un chemin; il gagne son procès. Le 9 octobre 1684 Gabriel de Berthé vend à Jean Milot 60 arpents du fief Bellevue. La résidence des Berthé était à Saint-Louis de Lachine. M. de Denonville écrit le 14 novembre 1685 que le sieur de Chailly avait vendu son magasin du Bout de l'Ile et qu'il passait en France, emportant une fortune de 40,000 livres. " Venu en ce pays avec rien, il s'est fait donner une concession au bout de l'île de Montréal, où il a fait très bien ses affaires par les traites qu'il y a faites contre les défenses qui ne permettent pas d'en faire ailleurs qu'à Villemarie. Les derniers jours que j'y étais, il fut surpris en fraude, ayant retenu chez lui au Bout de l'Ile, une partie des pelleteries qu'en canot venant des Outaouacs il devait apporter toutes au marchand qui l'a équipé ". Le 8 mai suivant, il ajoute : " Vous serez surpris d'apprendre que le sieur de Chailly, n'ayant pu avoir son congé pour se retirer en France avec tous ses effets qu'il y envoya l'an passé, avant mon arrivée, s'est dérobé et a déserté le pays pour passer à Orange (Albany) et de là, sans doute, en France par l'Angleterre. Je croyais qu'après lui avoir représenté que son honneur l'engageait à servir un pays qui lui a fait sa fortune, puisque de simple cadet qu'il était au régiment de Carignan, sans un sou de patrimoine, il a amassé ici 40,000 livres, il aurait bien dû attendre l'occasion de rendre quelque service à la colonie en cette conjecture (la guerre des Iroquois alors prochaine). Il y avait acheté une habitation au bout de l'île de Montréal, où il a fait tous ses profits, non sans bien des fraudes et supercheries. Quand je suis arrivé dans le pays, il avait vendu l'habitation, et l'on m'a assuré qu'il n'en a pas été payé. Il est d'une conséquence extrême, monseigneur, que cette désertion ne demeure pas impunie. Il a débauché avec lui un sauvage du Saut. Ce qu'il y a de désagréable, c'est qu'il aura dit au gouverneur Dongan (province de New-York) tout ce qu'il aura su des prises du côté de la baie du Nord (baie d'Hudson) et ce qu'il aura su des intérêts du pays et de nos desseins (pour surprendre les Iroquois). Je vous supplie très humblement de vouloir bien accorder la confiscation de ce qu'on lui trouvera d'effets aux deux hôpitaux de la colonie. Il n'y a pas de doute qu'il n'aille à la Rochelle où il a fait passer ses effets sur le navire de Dombourg, duquel on peut savoir des nouvelles, comme de la grande partie des marchands de la ville qui commercent ici. Son père est noble, à ce que l'on dit, fort pauvre, demeurant à Amboise, ayant eu une terre dans ce voisinage près le fan (?) Il a un frère aide-major de Brissac. S'il n'est pas châtié ce sera, je vous assure, un très méchant exemple pour tout le pays où la légèreté d'esprit cause le plus grand mal de toute notre jeunesse". Le ministre répond: " Sa Majesté avait accordé permission au nommé Chailly de repasser en France, mais sur ce qu'il a été écrit concernant cet homme, Elle a trouvé à propos de la révoquer ; ainsi, qu'on l'empêche de s'embarquer et l'oblige à demeurer pour continuer son commerce et la culture de son habitation ". Le 10 novembre 1686, Denonville revient à la charge: " Il n'y a rien à ajouter à ce que j'ai eu l'honneur d'écrire au sujet de Chailly qui a déserté le pays et qui a passé en France par la Nouvelle-Angleterre. Il serait fort dangereux qu'il n'y eut pas quelque exemple de cela. Il a assez gagné dans le pays pour mériter une amende d'un millier d'écus qui viendraient bien à propos pour aider à bâtir nos hospitalières de Villemarie où les pauvres religieuses et malades sont logés fort pauvrement. Il a acheté une terre près de la Rochelle où on le peut trouver aisément." Enfin, le 8 juin 1687, Denonville représente à la cour que " l'impunité du sieur Chailly décrédite fort mes défenses ". Après avoir cité cette correspondance, le juge Désiré Girouard observe (*Supplément au Lake St. Louis*) que, d'après les lettres des gouverneurs et intendants, " il est hors de doute que tous les marchands du lac Saint-Louis, que l'on appelait tantôt Haut de l'Ile, tantôt Lachine, jouissaient du privilège de faire la traite en dehors de Villemarie et dans leurs habitations particulières et que, assez souvent, les autorités fermaient les yeux, même lorsqu'ils trafiquaient dans les bois. En 1681, Perrot, l'ancien gouverneur de Montréal, faisait un commerce de 50,000 livres par an au fief Brucy, vis-à-vis le Bout de l'Ile, malgré ses démêlés antérieurs avec le gouverneur général ". C'est la morale de Chailly et de bien d'autres. [138]

Traiteurs et colons.

Le capitaine Pierre de Sorel, né en 1628 à Notre-Dame de Grenoble, paraît avoir demeuré à Sorel dès 1665; il y mourut en 1682. Sa situation devait être prospère car, outre qu'il commerçait, le recensement de 1681 lui donne 43 bêtes à cornes, 62 moutons, 18 chèvres, 150 arpents cultivés. Marié en 1668 avec Catherine Le Gardeur de Tilly, canadienne, il ne laissa pas d'enfants. [139]

Michel-Sidrac Dugué, sieur de Boisbriant [140] natif des environs de Nantes, servit dans les régiments de Montaigu et Chambellé. Dans ce dernier corps, il était capitaine lorsque, en 1664, on organisa une troupe pour l'Amérique, de sorte qu'il arriva à Québec conservant son grade de capitaine au régiment de Carignan. Le 14 juin 1666, on le voit en garnison à Montréal. L'automne de 1667, l'intendant Talon lui permit de faire travailler à des défrichements sur l'île Sainte-Thérèse près de Repentigny ; le titre de cette seigneurie lui fut donné le 29 octobre 1672.[141] C'est aussi l'automne de 1667 qu'il épousa, à Montréal, Marie Moyen, veuve du sergent-major Lambert Closse. Il commandait à Montréal en 1670. Tout en colonisant un peu l'île Sainte-Thérèse il avait les yeux fixés sur les belles terres du haut de l'île de Montréal et, en 1671, voyant Lafrenaye-Brucy et surtout Berthé-Chailly qui plantaient leurs établissements dans ces lieux, il s'empressa d'y ériger un bâtiment quelconque pour faire acte de possession, mais bientôt il donna de la valeur à ce poste qui lui fut concédé régulièrement (19 janvier 1672) par le séminaire et qui prit le nom de fief Boisbriant. Il est situé à l'entrée du lac des Deux-Montagnes et mesure en superficie 200 arpents. En 1678 on rencontre Dugué de Boisbriant à l'assemblée des notables pour examiner la question de la traite de l'eau-de-vie. Vers cette date, il alla demeurer à l'île Sainte-Thérèse, car son fils Joseph-François fut baptisé[142] à la Pointe-aux-Trembles le 18 mars 1679. Trois mois plus tard il vendait le fief Boisbriant, au prix élevé de 1768 livres, à Charles Lemoine de Longueuil et Jacques Le Ber. Jusqu'à 1685 cette propriété resta aux deux associés, puis Le Ber la garda seul et lui imposa le nom de Senneville qu'elle conserve de nos jours. Au recensement de 1681, descendant le fleuve, on voit Longueuil puis l'île Sainte-Thérèse, ensuite le fief Tremblay et Boucherville. L'île Sainte-Thérèse compte 9 hommes, 9 femmes mariés, 19 hommes ou garçons, 16 filles—en tout 53 âmes. Ces habitants sont : Dugué, Brien, Catin, Gauthier, Trochon, Limousin, Ragueneau, Desmares, Voine, Hayet, Masta, Bousquet, Trajean, Choquet. Le seigneur Dugué est porté à 43 ans, sa femme à 34 ; sept enfants : Jean, 13; Marie, 11; Jacques, 10; Pierre, 8; Jeanne, 6; Joseph, 4; Elizabeth, 1. Domestiques : Jean Deperteau, 51; Nicolas Ragueneau, 33; Marie. . ., 20. 4 fusils, 4 pistolets, 16 bêtes à cornes, 40 arpents de terre en valeur. Trois colons possèdent chacun de 8 à 9 arpents de terre cultivée ; les autres, de 2 à 4 seulement. Il est visible que Dugué avait vécu en haut de Montréal par le commerce des pelleteries et qu'il continuait ce négoce à l'île Sainte-Thérèse, car ses défrichements ne donnent pas l'idée d'un cultivateur indépendant. Comme il lui fallait de vastes domaines pour subsister d'après ce régime, il se fit accorder une autre seigneurie, à la côte du nord, le 24 septembre 1683, comprenant " les terres qui sont à commencer où finit la concession du sieur Daulier des Landes (Terrebonne) dans la rivière Jésus, jusqu'à la rivière Duchêne, icelle comprise, ce qui compose un front de quatre lieues et demie sur trois de profondeur ". Cette seigneurie, dite des Mille Iles, retourna à la couronne le 1^er^ mars 1714, faute d'être habitée. Cinq jours plus tard, le gouverneur et l'intendant l'accordaient à deux fonctionnaires : 1° Jean Petit, trésorier de la marine en ce pays, conseiller et ancien contrôleur des rentes de l'hôtel de ville de Paris, marié en 1706 à Charlotte, fille du capitaine Sidrac Dugué (alors défunt) ; 2° Charles-Gaspard Piot, écuyer, sieur de l'Angloiserie, chevalier de l'ordre de Saint-Louis, lieutenant du roi au gouvernement de la ville de Québec, marié en 1691 à Marie-Thérèse, fille du dit capitaine Dugué. Ce dernier prit une part utile aux campagnes de 1684, 1687, contre les Iroquois, à la tête d'un bataillon de la milice. Il décéda en décembre 1688, un an après sa femme. Trois de leurs fils ont fourni des carrières militaires remarquables, à la baie d'Hudson, Terreneuve, contre les Iroquois, aux Antilles, à la Louisiane, dans l'ouest et au Détroit. La descendance est encore nombreuse et bien vue en Canada. [143]

Fonctionnaires, militaires et colons.

Paul Dupuis, originaire de Notre-Dame-du-Pommier, près d'Arles, en Provence, enseigne au régiment de Carignan, se maria le 22 octobre 1668, à Québec, avec Jeanne Couillard, canadienne, et se fit accorder l'île aux Oies où il alla aussitôt demeurer, car on l'y retrouve à partir de 1673 jusqu'à sa mort en 1713. Le recensement de 1681 lui donne 44 ans, 6 enfants, 2 domestiques, 1 fusil, 24 têtes de bétail, 20 arpents de terre en culture. Il y a cinq habitants avec un total de 45 arpents défrichés. Comme il fallait vivre, le sieur Dupuis accepta la charge de lieutenant particulier ou juge de Québec, mais le magistrat reprit l'épée en 1687 contre les Iroquois, et en 1690 contre les Anglais. Le 1^er^ juin 1695, le roi signait en sa faveur des provisions de lieutenant particulier à la prévôté de Québec. Il était à sa mort, le 21 décembre 1713, lieutenant général de la prévôté. L'un de ses nombreux enfants, officier dans les troupes de la colonie, est cité par Charlevoix pour avoir porté, durant plusieurs jours, la fille d'un juge anglais capturée par les Canadiens dans la guerre de 1708 ; lorsqu'il arriva à Montréal avec son aimable fardeau, la ville lui fit une ovation. En 1710 le gouverneur général écrivait que Dupuis était l'un des deux ou trois meilleurs " partisans " de tout le Canada et il accollait à son nom celui de Hertel de Rouville, ce qui n'est pas peu dire. [144]

Pierre Bécard de Grandville, né vers 1640, fils de Denis Bécard et de Jeanne Milleron, paroisse Saint-Eustache de Paris, enseigne dans le régiment de Carignan, épousa, à Québec, le 22 octobre 1668, Anne Macart, et de ce mariage sont nés quinze enfants, de 1669 à 1696, tous à Québec. Bécard est qualifié d'enseigne en 1672 lorsqu'on lui accorde la concession de l'Ilet-du-Portage. En 1687, dans la campagne contre les Iroquois, il se distingua à la tête de quatre compagnies de milice qu'il commandait. En 1690 on le chargea de faire une reconnaissance sur le fleuve, de Québec à Tadoussac, à l'approche de la flotte de Phipps qui voulait enlever Québec. Il fut pris [145] et amené prisonnier à Port-Royal. Le 1er juin 1695, on le nomme procureur du roi à la prevôté de Québec. Il était devenu lieutenant d'une compagnie franche et ce grade est mentionné en 1696, à l'occasion d'une terre qu'on lui accorde près de son fief de l'Ilet. Deux ans plus tard il reçut une adjonction à ces deux seigneuries. Il commandait alors le bataillon de milice de Beauport. En 1700, le gouverneur et l'intendant le proposèrent au roi pour être major des Trois-Rivières, mais on répondit que la chose ne se pouvait vu sa parenté avec Prevost, gouverneur du poste en question. Sa sépulture est inscrite à Québec le 6 mai 1708. Avec d'Iberville, à la baie d'Hudson, en 1697, il y avait un garde-marine du nom de Grandville, qui nous paraît être un fils de l'officier du régiment de Carignan. Un autre fils de ce dernier était procureur du roi à la prevôté de Québec et, à son décès, fut remplacé, le 14 avril 1700, par l'un de ses frères. Le 20 juin 1703, la compagnie du sieur de Louvigny passa par décision royale au sieur de Grandville. Aucun des garçons de l'officier du régiment de Carignan ne parait s'être marié, de sorte que sa descendance s'éteignit en 1754, à la mort de Paul, sieur de Fondville, appelé communément le chevalier. [146]

Colons et militaires.

Alexandre Berthier, né en 1638, fils de Pierre de Berthier et de Marguerite Bariac, de Saint-Jacques de Bergerac, diocèse de Périgueux, devint capitaine au régiment de Lignière, passa au régiment de Carignan, se signala dans la campagne contre les Turcs. Le 8 octobre 1665, porte le *Journal des Jésuites,* " un capitaine d'une des compagnies de M. de Tracy fait abjuration d'hérésie dans la grande église (Québec) entre les mains de monseigneur, habillé pontificalement, accompagné de tout le clergé en surplis, en présence de monseigneur de Tracy, M. de Courcelles, gouverneur, M. l'intendant et quatre de nos pères ". C'est notre officier. En 1666 il commandait au fort Saint-Jean; il eut la direction de l'arrière-garde dans la marche de M. de Tracy, l'automne de cette année. En 1672 il accompagnait M. de Courcelles dans sa promenade militaire à Cataracoui et, l'année suivante, il retournait dans ces lieux avec le comte de Frontenac pour y fonder un fort. Le 11 octobre 1672 il épousait Marie, fille de Charles Le Gardeur de Tilly. Dix-huit jours plus tard, on lui accorda la seigneurie de Bellechasse. Il acquit du sieur Randin, l'année suivante la seigneurie qui porte le nom de Berthier-en-haut. Jusque là il demeurait à Québec, mais le 20 septembre 1674 il faisait baptiser sa fille, Charlotte-Catherine, à Sorel, et au même endroit le 3 juillet 1676 avait lieu le baptême de son fils Alexandre, qui hérita de ses deux seigneuries. Quant à Charlotte-Catherine, elle entra aux Hospitalières de Québec le 10 octobre 1689, devint professe le 18 juin 1691, et décéda le 21 octobre 1698. Le recensement de Villemur (Berthier-en-haut) montre en 1681: Alexandre Berthier, 43 ans, (sa femme était morte); Alexandre, 5 ans; Catherine, 7 ans; Jacques Chauveau, 40 ans, domestique, trois fusils, 10 bêtes-à-cornes, 30 arpents de terre en valeur. Son fermier était Pierre Bazin en 1674. Le 10 octobre 1682, M. de Berthier assiste à un conseil de guerre. La seigneurie de Bellechasse, voisine de celle de Couillard de l'Epinay, fut l'objet d'une dispute judiciaire en 1684-5, afin de régler les bornes des deux propriétés. En 1687 Berthier prit part à la guerre contre les Iroquois à la tête d'un corps de milice. En 1697, il avait une maison à Québec et y demeurait probablement. On perd sa trace après 1708. En 1709 les intendants Raudot le citent comme défunt. Son fils Alexandre épousa, le 4 octobre 1702, à Québec, Marie-Françoise, fille de François Viennay Pachot ou Pacaud, marchand, originaire de Grenoble, marié avec Charlotte-Françoise Juchereau de Saint-Denis, dont le père était seigneur de Beauport. Alexandre mourut à Québec, le 11 janvier 1703, et sa veuve se remaria en 1712 avec Nicolas Blaise des Bergères de Rigauville. Les Berthier n'ont pas laissé de descendance en Canada, de sorte que la veuve d'Alexandre hérita de leurs deux seigneuries. Le 25 février 1740, elle vendit à François Martel de Brouage, commandant pour le roi au Labrador, et à Pierre Désauniers, négociant de Québec, un établissement situé au Trou, seigneurie de Bellechasse, à l'endroit nommé Courville, près du fossé de Bicêtre,—d'après un catalogue de la librairie Dufossé, de Paris. [147]

Olivier Morel, sieur de la Durantaye, né à Notre-Dame de Gaure, diocèse de Nantes, en 1641, était enseigne dans les troupes, puis passa lieutenant au régiment de Chambellé et arriva dans la colonie avec le grade de capitaine au régiment de Carignan. Il était au fort Sainte-Anne avec La Motte en 1666. Il passa en France et revint en 1670. Le 14 septembre de cette dernière année il épousait à Québec, Françoise Duquet, canadienne ; il reçut la seigneurie de Bellechasse, ensuite celle de la Durantaye, qui se peuplèrent assez promptement de colons venus de la côte du nord. La famille demeurait à Québec où le sieur de la Durantaye servait comme officier de la garnison. En 1683 il allait commander dans l'ouest, prit une part marquante aux expéditions de 1684 et 1687 contre les Iroquois, fut capitaine réformé en 1689, revint de l'ouest en 1690 où La Porte de Louvigny le remplaça, devint capitaine en pied vers 1694 avec cette note des autorités: "Bon officier, honnête, homme propre à tout; mérite une compagnie". En 1696 il commandait un bataillon de milice dans la guerre contre les Iroquois. On le considérait comme le premier militaire du pays. A la mort du comte de Frontenac, 1698, il se brouilla avec M. de Callières qui devint bientôt gouverneur général et le négligea. En 1701, il fut nommé membre du Conseil Supérieur avec une pension de six cents francs, mais il ne prit son siège que sous M. de Vaudreuil en 1703. Il paraît qu'il mourut pauvre, en 1717, quoique ses deux seigneuries fussent alors dans un bon état de développement.[148]

Séraphin Marganne, sieur de la Valterie, natif de Saint-Benoit de Paris, lieutenant au régiment de Lignières, avait pris du service sous M. de Tracy en 1664 et vint au Canada avec les troupes l'année suivante. En 1668 il épousa Louise Bissot, une canadienne, et reçut la seigneurie de Lavaltrie en 1672. Au recensement de ce dernier lieu, l'automne de 1681, il est dit âgé de 38 ans, sa femme 29 ; ils ont sept enfants, et 20 arpents de terre défrichée ; les 9 habitants de la seigneurie n'ont ensemble que 57 arpents sous culture. Vers ce temps l'ouest prenait de l'importance par suite du trafic des fourrures ; M. de la Valterie fut envoyé pour y commander. M. de la Durantaye le remplaça en 1683. Il paraît n'avoir plus quitté sa terre après cela. Sa femme mourut en 1691, lui en 1699. Deux de ses fils ont été militaires.[149]

François Jarret de Verchères, né en 1641 en Dauphiné, enseigne de la compagnie de Contrecœur, épousa, le 17 septembre 1669, à l'île d'Orléans, Marie Perrot, canadienne, et se fixa de suite dans la seigneurie dite de Verchères dont le titre lui fut donné un peu plus tard. En 1687 il commandait un bataillon de milice contre les Iroquois. Il mourut après 1693, laissant une belle famille. Ses fils et petits-fils ont été militaires et cultivateurs comme lui ; on les cite à plusieurs reprises dans les annales du temps ; ils ont commandé dans l'ouest.

Un frère ou un cousin de François de Verchères se nommait André Jarret de Beauregard; on lui donne le grade de lieutenant dans une liste de 1669. Le 12 janvier 1676, il épousait, à Montréal, Marguerite Anthiaume, native de Paris. Ce ménage vécut à Verchères. Au recensement de 1681, on voit les deux familles à la tête de cette seigneurie. En 1685, André obtint trois îles, appelées Beauregard, situées presque vis-à-vis Verchères. Il a dû mourir entre les années 1686 et 1690.

Le capitaine Pierre de Saint-Ours, d'une ancienne famille noble du Dauphiné, et parent du maréchal d'Estrades, vice-roi de la Nouvelle-France, était né en 1643. Il épousa (1667), à Montréal, Marie Mullois dont le père avait été, en France, lieutenant aux carabiniers.

Ce ménage ne tarda pas à se fixer sur la seigneurie dite de Saint-Ours, dont le titre lui fut accordé plus tard (1672). Au recensement de 1681, la terre du sieur de Saint-Ours avait 40 arpents cultivés. Il fit du service militaire en diverses occasions, devint premier capitaine des troupes du Canada et reçut la croix de Saint-Louis dès l'époque de la fondation de l'ordre. Il mourut après 1708. Sa descendance compte de brillants officiers. Ayant une nombreuse famille et peu de ressources pécuniaires, il lutta avec énergie pour vivre de son travail comme habitant et fut l'un des plus beaux exemples de ces temps difficiles.

Le chevalier Roque ou Roch de Saint-Ours, de la compagnie de Chambly, avait reçu un fief en 1672, contigu à celui du capitaine de Saint-Ours. On ne saurait dire ce que devint ce personnage. Le nom de Roch a été traditionnel dans la famille Saint-Ours, jusqu'à notre époque.[150]

Un marchand.

Jacques Baby ou Babie, né en 1633, fils d'honorable homme Jehan Babie, seigneur de Ranville, et d'Isabeau Robin, de Montretou, diocèse d'Agens, Guyenne, sergent de la compagnie de Saint-Ours, s'établit à Champlain, l'été de 1668, et y acheta des terres. Il se livra au commerce. Le 1er juin 1670, à Champlain, il épousa Jeanne, fille de Pierre Dandonneau, et mourut en ce lieu le 28 juillet 1688.[151] Sa descendance a fourni, jusqu'à présent, des hommes qui ont occupé des postes en évidence dans la magistrature, l'ordre militaire, la politique, le commerce, dans le Haut et le Bas-Canada.

Colons.

François Pollet de la Combe Pocatière, natif de Chelieu, diocèse de Grenoble, était capitaine réformé et maréchal des logis au régiment de Carignan. Le 29 novembre 1669, à Québec, il épousa Marie-Anne Juchereau, canadienne, qui lui donna deux filles: Thérèse, 27 mars 1672, mariée le 8 octobre 1693, Québec, avec le fameux d'Iberville; et Louise (son aînée) qui épousa Augustin Rouer de la Cardonnière. Le sieur de la Combe mourut le 20 mars 1672, sept jours avant la naissance de sa dernière fille. Le 29 octobre suivant, la veuve reçut le titre de la seigneurie de Sainte-Anne de la Pocatière qu'elle mit en valeur selon ses moyens. En 1672, cette femme avec ses deux enfants, vivait à Beauport. Elle se remaria, le 23 février 1683, avec François-Madeleine-Fortuné Ruette, sieur d'Auteuil, l'un des principaux membres du Conseil Supérieur de Québec.[152]

Jean de l'Epinay, lieutenant, demandait de repasser en France avec le régiment, mais il aima mieux finalement se faire colon. Il était natif de Nantes. Le 11 septembre 1673, à Québec, il épousa Catherine Granger, de Saint-Médard, diocèse de Meaux. Ce ménage demeura toujours à Beauport où furent baptisés leurs onze enfants, de 1674 à 1697. Au recensement de cette paroisse en 1681 on lit: "Jean L'Espinay, 34 ans; Catherine Granger, 26 ans; Madeleine, 5 ans; Catherine, 3 ans; Geneviève, 8 mois; 1 fusil, 1 vache, 6 arpents en valeur".

Arnoult de Loubias, capitaine au régiment de Broglie (prononcez Broille) commandait aux Trois-Rivières le 8 avril 1668, et ne cessa d'y demeurer jusqu'à son départ pour la France en 1674. Entre ces deux années, il avait fait le voyage de Cataracoui avec M. de Courcelles et autres en 1671, et donné un très bon commencement à la seigneurie de Nicolet qu'il passa au sieur Michel Cressé.

Pierre Mouet de Moras, enseigne de la compagnie de Loubias au régiment de Broglie, né en 1639, à Castel-Sarrasin, en Basse-Guyenne, épousa, aux Trois-Rivières, le 8 avril 1668, Marie Toupin, canadienne, qui lui donna une belle famille. Ils s'établirent dès 1669 sur l'île appelé Moras à l'entrée de la rivière Nicolet et vécurent comme cultivateurs. Parmi leurs descendants directs on compte le fameux Charles Mouette de Moras, sieur de Langlade.[153]

Le sergent Jacques Labadie était aux Trois-Rivières l'été de 1669. Le 16 novembre 1671, il y commandait la garnison et assistait aux mariages de trois colons de la seigneurie de Loubias (Nicolet) qui appartenait au capitaine Arnoult de Loubias, dans la compagnie duquel Labadie servait en arrivant de France avec le régiment de Carignan. En 1672 on lui accorda un fief dans la banlieue des Trois-Rivières qu'il établit et légua plus tard à la famille Godefroy, à condition que le titulaire porterait son nom—de là les Labadie Tonnancour et Godefroy Labadie. Quant au sergent Jacques il ne se maria point. En 1674 il est appelé major, mais il faut lire sergent major de la garnison des Trois-Rivières, poste qu'il occupa jusqu'à 1689 au moins. De cette date à 1707 où il mourut, on le retrouve constamment aux Trois-Riviéres. Le registre de la paroisse le nomme parfois Jacques de Labadie, M. de Labadie, le major de Labadie. Il a été parrain vingt fois.[154]

Laurent Bory ou Bornay, sieur de Grandmaison, né vers 1640, au diocèse d'Angers, se maria, le 8 février 1672, à Montréal, avec Marguerite Le Merle de Hautpré, native de Saint-Gervais de Paris. Le 3 novembre suivant, Talon lui accorda trente arpents de terre de front sur une lieue de profondeur, à prendre au bord du fleuve Saint-Laurent, depuis le fief du sieur Saint-Michel en descendant jusqu'aux terres non concédées. On nomma cette seigneurie la Guillodière. Le 17 août 1674, le sieur André Jarret de Beauregard reçut trois îles "dont l'une est au devant du bout de la seigneurie de Verchères, en montant, et les deux autres étant sur la ligne qui regarde les îles appartenant au sieur de Grandmaison ". La famille de ce dernier subsiste peut-être encore parmi nous. [155]

Antoine Pecaudy de Contrecœur, né en 1596, au bourg de Saint-Chef, diocèse de Vienne en Dauphiné, est mentionné avec éloge dans les lettres de noblesse que Louis XIV signait en sa faveur, au mois de janvier 1661 : " Ayant été bien informé par tous les généraux de notre armée de la valeur et générosité de notre cher et bien-aimé Antoine Pecaudy de Contrecœur, capitaine au régiment de Carignan, lequel, depuis l'établissement d'icelui, nous a rendu, et au feu roi notre très honoré seigneur et père, des preuves de son courage, affection et fidélité à notre service, dans nos armées et troupes, tant cavalerie qu'infanterie, l'espace de vingt-cinq ans, ayant commandé, soit en qualité de lieutenant ou de capitaine, depuis quinze ans en ça au régiment de Montesson et de celui de Carignan, s'étant trouvé à tous les exploits de guerre qui se sont présentés, particulièrement au siège de Pignerolles sous le feu sieur de Montmorency, de la compagnie Lapoupe au régiment de Sault, comme aussi au combat de Chezin en la compagnie des chevaux-légers de Dizi....is sous le sieur de Crecquy où il fut blessé d'une mousquetade à l'épaule, et au siège de Valence d'un coup de mousquet à la cuisse, et. . . au dit régiment de Carignan au retour de Vigune, au combat de . . . sous le prince Thomas où il fut blessé d'une mousquetade à la tête dont il a été trépané ; au faubourg d'Estampes fut blessé d'une mousquetade à travers le corps, au faubourg Saint-Antoine fut blessé d'une mousquetade à travers le corps dans la même compagnie où il fut blessé d'une mousquetade au bras dont il demeura estropié, sous notre cousin le vicomte de Turenne, l'année dernière, commandant le régiment de Carignan à l'attaque d'Auxerre sous notre cousin le maréchal de Grancey et Piedmont, et finalement tous les autres lieux où il a été commandé, en sorte que nous avons tous sujets et satisfaction de le juger digne de l'honneur au titre de noblesse auquel il a aspiré."

Le 17 septembre 1667, à Québec, il épousa Barbe Denys, une canadienne, âgée de quinze ans et trois mois. Lui en avait soixante et onze. La seigneurie dite de Contrecœur lui fut accordée en 1672, et il alla y demeurer avant 1677. Le recensement de 1681 lui donne trois enfants : Louis, 13 ans, qui mourut en 1687 ; Marie, 5 ans, mariée plus tard à Jean-Louis de Lacorne ; François-Antoine, 1½ an, qui a continué la famille. Ce ménage a 80 arpents de terre en valeur. Le père, le fils et deux petits-fils comptent des services militaires non-interrompus de 1637 à 1760; à eux quatre ils ont reçu plus de 60 blessures dans les combats. [156]

XI

Il est impossible d'indiquer les familles canadiennes fondées par des soldats du régiment de Carignan—c'est peut-être à cause de cela que tant de gens se disent issus de cette troupe. Après avoir relevé dans les journaux une centaine de prétentions de ce genre et fait autant d'enquêtes qui ont abouti à une fin négative, nous abandonnons l'épreuve.

Mais les officiers ! Eh bien, voyons ce qu'il en reste. Nous n'avons que six familles à nommer: Baby de Ranville, Tarieu de Lanaudière, Dugué de Boisbriant, Morel de la Durantaye, Gautier de Varennes, Mouet de Moras.

NOTES

[1] Pour plus de détails voir *Documents sur la Nouvelle-France*, 1883, tome I, 249-50 ; *Histoire des Canadiens-Français*, III, 4, 12, 14, 20, 27, 41-2, 51, 53, 120 ; IV, 3, 4, 8, 10, 17, 26 ; *Société Royale*, 1896, pp. 121, 163 ; 1901, pp. 3-33.

[2] Disons la rivière Susquehanna puisque Wm Penn n'arriva dans cette contrée que trente ans plus tard.

[3] Sur ces Sauvages voir *Relations des Jésuites*, et *Société Royale*, 1901, p. 50.

[4] *Relation*, 1661, pp. 31, 39.

[5] Société Royale, 1896, pp. 105-7.

[6] Celui de Pierre Boucher était de 1662.

[7] Rameau, *La France aux Colonies*, II, 23.

[8] De 1608 à 1662, les colons étaient venus d'eux-mêmes. De 1662 à 1672, le roi en envoya de 1,500 à 2,000, après quoi il ne fit plus rien pour le Canada.

[9] Marie de l'Incarnation, automne de 1663.

[10] Girouard, *Lake St. Louis*, p. 8.

[11] Cinq soldats. .. la chose demande explication.

[12] Le R. P. Gabriel Daniel, jésuite, *Les Milices Françaises*, 1721, tome II, 53, 421. Sur Johann von Balthazar qui fut un célèbre partisan et le bras droit de Condé en 1650-54, on peut voir l'ouvrage du duc d'Aumale, *Histoire des Princes de Condé*, V, 159-60, 201, 595-6, 668; VI, 21, 114, 163, 288-9, 291, 311, 655, 659; VII, 55.

[13] Descendance: Jacques de Balthazar, surintendant général de Poméranie ; Henri, conseiller provincial de Poméranie ; Jacques, conseiller privé de Mecklemburg ; Georges-Nicolas, lieutenant-colonel au régiment Schultz, infanterie suédoise—sa femme était Eléonore de Hertel; Phillippe-Christophe de Balthazar, né 22 janvier 1724, en Poméranie, entre au service de la France sous le maréchal de Saxe, passe par tous les grades, fait huit campagnes en Flandre et en Allemagne, est major au régiment de Schomberg-dragons en 1768, colonel du 3ème chasseurs à cheval, brigadier en 1780, maréchal de camp en 1784, émigre en 1791 et meurt à l'armée de Condé en 1795. Il avait épousé (1768) M.-Madeleine de Turckheim, d'une bonne famille d'Alsace. Son fils Louis-Frédéric, né le 26 mars 1773, sous-lieutenant au régiment d'Alsace en 1784, lieutenant aux carabiniers de Monsieur en 1789, tué à l'armée de Condé en 1794 avec le grade d'adjudant-major au régiment d'infanterie de Lœwenstein, a été le dernier de son nom. Sa sœur unique, Marie-Henriette-Louise-Eléonore, ayant épousé M. Joseph de Kastner, né en 1772 à Molsheim, Alsace, fut la grande-mère de M. Frédéric de Kastner, professeur au " High School " de Québec, arrivé en Canada en 1877.

[14] Frédéric de Kastner ; *Les Héros de la Nouvelle-France*, Québec, 1902, p. 93.

[15] Sir James LeMoine, *Société Royale*, 1892, p. 20.

[16] Peut-être le père de M. de Varenne qui vint au Canada avec le régiment de Carignan.

[17] Victoire de Fribourg, prises de Philipsbourg et de Mayence; Spire délivrée.

[18] Il devait être de la famille de Jean Talon qui devint intendant de la Nouvelle-France en 1665.

[19] Famille savoisienne passée en France vers 1630. Madame la marquise de Créquy (*Souvenirs*, VII, 241) prétend que Broglie ou Debroglio veut dire Dumoulin en patois du comté de Nice. Le nom est Broglia en italien, Broglie en français. Nous prononçons Broille. Le prince de Condé écrivait et disait toujours Broillion.

[20] *Lettres et mémoires de M. de Turenne*, par le comte de Grimoard, 1782, 2 vol. in-fol., I, 49, 101, 200, 217, 249, 256, 261, 263, 265-6, 268-9 ; Adrien Pascal *l'Armée Française*, II, 50.

[21] Daniel, *Les Milices Françaises*, II, 421.

[22] C'est alors qu'il dut lever le régiment de Carignan.

[23] Adrien Pascal, *L'Armée Française*, II, 72.

[24] C. Rousset, *Histoire de Louvois*, I, 222-3.

[25] Daniel, *Les Milices Françaises*, II, 350-1, 373, 384-7, 406.

[26] Nous n'en voyons aucun au régiment de Carignan au Canada.

[27] Daniel, *Les Milices Françaises*, II, 58-62, 65, 431-32.

[28] *Edits et Ordonnances*, III, 27 ; Lafontaine, *Vice-Rois*, 1859, p. 119.

[29] Rameau, *La France aux Colonies*, II, 23.

[30] Il était âgé de 62 ans. Harrisse, *Bibliographie*, 108.

[31] M. de la Barre exploita pour son compte l'île de Cayenne et fut cause de la ruine de cette colonie. Retourné en France, on le récompensa de ses méfaits en le nommant gouverneur du Canada (1682) où son passage fut désastreux.

[32] *Relation* des jésuites, 1665, p. 3.

[33] *Journal des Jésuites*.

[34] Garneau, I, 215.

[35] Peut-on dire qu'il existe pour nous ou pour d'autres peuples un sang étranger au nôtre ? N'est-ce pas l'éducation, bonne ou mauvaise, l'influence du milieu où l'on vit qui créé les races physiquement, moralement et sous le rapport de l'intelligence ? Depuis Adam et Eve c'est le même sang qui donne des produits variés.

[36] C'est le nom de sa mère et aussi le nom d'un régiment commandé par un membre de sa famille.

[37] M. de Chambly était un autre homme.

[38] Commandant des troupes du district de Montréal.

[39] C'est la vérité.

[40] Faillon, III, 340.

[41] Il ne dit pas qu'elles sont du régiment de Carignan.

[42] Les officiers français ne le comprirent pas, par malheur.

[43] Il y a des notices sur le régiment de Carignan dans *La Revue Canadienne*, 1868, p. 802, 1878, p. 535, 1893, p. 281-3; *La Revue de Montréal*, 1878, p. 78, 1879, p. 444-7; *Institut Canadien* de Québec, 1875, p. 25, 1880, p. 17; *The Antiquarian*, 1875, p. 67 ; Bibaud : *Bibliothèque Canadienne*, 1825, p. 57; *Rapport de l'Agriculture*, Québec, 1874, p. 198; Ferland, *Cours*, II, 38-42, 73-4.

[44] Il était venu un cheval en 1648, mais on ne dit pas s'il vécut ou non une fois en Canada. Avec l'envoi de 1665, et d'autres qui suivirent, commença la race des chevaux canadiens.

[45] Marie de l'Incarnation, 28 juillet 1665.

[46] *Société Royale*, 1901, pp. 61-2, 64, 75.

[47] Probablement Pierre-Esprit Radisson avec son beau-frère Médard Chouart des Groseillers.

[48] Marie de l'Incarnation, 28 juillet 1665.

[49] Sur les Iroquois voir *Société Royale*, 1901, pp. 48-52.

[50] Le catalogue de la librairie Dufossé, Paris, offre en vente l'original de cet acte. Voir Tanguay, I, 87, 494.

[51] Le calendrier du *Journal de l'Instruction Publique*, 1869, dit que le fort de Sorel fut commencé le 6 juin.

[52] Marie de l'Incarnation, 30 septembre 1665.

[53] La Potherie, I, 256; *Histoire de l'Hôtel-Dieu de Québec*, 1878, p. 267.

[54] Marie de l'Incarnation, 29 octobre 1665.

[55] Faillon, III, 127.

[56] En 1609 Samuel Champlain lui donne de 80 à 100 lieues. Il en a une trentaine.

[57] *Relations des Jésuites*, 1665, pp. 10, 25. Voir *Le Fort Sainte-Anne* de M. Lucien Huot.

[58] Nicolas Perrot, p. 111.

[59] Nicolas Perrot, p. 111.

[60] La Potherie, II, 85. Voir Ferland, II, 50; Faillon, III, 135, 137; *Journal des Jésuites*, pp. 346, 349; Perrot, pp. 111, 252, 340.

[61] C'était en juillet.

[62] Mensonge et ruse ordinaire des Iroquois en pareils cas.

[63] Nicolas Perrot, p. 112-13.

[64] Ils ramenaient Noyrolle ou Leroles, comme il a été dit plus haut.

[65] Non pas le Bâtard Flammand, mais Agariata, chef agnier dont il vient d'être fait mention.

[66] Nicolas Perrot, p. 113. Voir La Potherie, II, 85.

[67] Nicolas Perrot, p. 114.

[68] Marie de l'Incarnation, 12 novembre 1666.

[69] A Montréal. Ils allèrent, après 1672, jusqu'aux postes anglais de la baie James où il y a une rivière qui porta leur nom.

[70] Au sujet des Iroquois qui émigèrent dans le Haut-Canada, voir *Société Royale*, 1901, pp. 47, 53.

[71] Nicolas Perrot, p. 114.

[72] *Edits et Ordonnances*, II, 32.

[73] De $200 à $250.

[73a] Paul Gaulot.

[74] Ferland, *Cours d'histoire*, II, 62.

[75] Edouard Richard, *Rapport sur les Archives*, 1899, pp. 53, 238.

[76] Lettre de Colbert, 15 mai 1669.

[77] Talon amenait avec lui François-Marie Perrot, capitaine au régiment d'Auvergne, marié à sa nièce. Il le fit de suite gouverneur de Montréal et, en 1672, lui donna l'île Perrot avec les ilets environnants. Le premier valet de chambre du roi se nommait Perrot, neveu de Talon. Voir *Société Royale*, 1901, pp. 71, 75.

[78] Celles dont parlait Colbert le 15 mai 1669. Talon avait été beaucoup retardé dans ce voyage.

[79] Rameau, *La France aux Colonies*, II, 30.

[80] Garneau, I, 218.

[81] Lettre de Talon à Colbert, 10 novembre 1670.

[82] Edouard Richard, *Rapport sur les Archives*, 1899, pp. 54, 243.

[83] Voir *The Antiquarian*, Montréal, volume IV, années 1875-76, pp. 67, 132.

[84] Les cultivateurs, appelés " habitants ", venus de 1632 à 1664.

[85] Il y avait à peine seize ans.

[86] Ils y étaient déjà. La Hontan n'a pas l'air de savoir ce qui en est.

[87] A la même époque, les nombreux colons arrivés de France, hommes et femmes, ne sont pas mentionnés par La Hontan.

[88] La Hontan, lettre datée de Beauport, 2 mai 1684.

[89] De 1667 à 1684.

[90] Ceci est terriblement exagéré.

[91] La Potherie, écrit en 1700, I, 367-8; III, 55.

[92] Cette expression voudrait dire plus de 1000 soldats, ce qui est quatre fois trop.

[93] Le Beau, écrit en 1729, I, 91.

[94] Après être devenu Carignan-Sallières, vers 1660.

[95] Ce calcul nous laisserait plus de mille hommes, ce qui serait beaucoup exagéré.

[96] Daniel, *Les Milices Françaises*, II, 421.

[97] Garneau, I, 214.

[98] Talon et ses gens arrivèrent après que le recensement fut terminé.

[99] Pris avant l'arrivée des navires de France.

[100] Edme Rameau, *La France aux Colonies*, 1859, II, 25-31.

[101] Ferland, *Cours d'Histoire*, II, 9.

[102] Tanguay, *Dictionnaire*, I, p. lx.

[103] Edouard Richard, *Rapport sur les Archives*, 1899, p. 31.

[104] Voir *Société Royale*, 1901, p. 64.

[105] Daniel, *Les Milices Françaises*, II, 53, 421-2.

[106] *Les Nièces de Mazarin*, par Amedée Renée, 1857, p. 211.

[107] Adrien Pascal, *L'Armée Française*, II, 226.

[108] *Société Royale*, 1901, pp. 71, 75, 77, 79-81.

[109] Faillon, III, 383-391.

[110] *Conseil Souverain*, I, 535.

[111] Faillon, III, 441.

[112] Faillon, III, 443.

[113] Voir aussi l'épisode de Banchaud: Note III sur le *Voyage* de Dollier et Galinée; *Société Royale*, 1901, p. 81.

[114] De nos jours on dit assassinat.

[115] Nicolas Perrot, pp. 115-17. La Mère de l'Incarnation dit à peu près la même chose.

[116] Sur ce groupe d'officiers voir *Conseil Souverain*, I, 402, 410, 458; Tanguay, I, 87, 230, 233, 241, 439, 465, 495, 499, 566, 571; *Relation*, 1666, pp. 6-9; Girouard, *Lake St. Louis*, 173; *Histoire du Montréal*, p. 187; Faillon, III, 135, 153; *Bulletin des Recherches*, 1901, p. 368; Ferland, *Cours*, II, 50; Lucien Huot, *Le Fort Sainte-Anne*, pp. 24, 31, 38.

[117] Tanguay, I, 455, 566. *Conseil Souverain*, I, 378.

[118] Tanguay, *Répertoire*, p. 47; lettre de M. de l'Incarnation, 18 octobre 1667.

[119] *Journal des Jésuites*, 19 août 1665; M. de l'Incarnation, 18 octobre 1667; Faillon, III, 138-9, 143; Tanguay, *Répertoire*, p. 47; *Ursulines des Trois-Rivières*, I, 431.

[120] Tanguay: *Répertoire du clergé canadien*.

[121] Richard, Archives, 1899, pp. 199, 241, 247 ; Ferland, II, 79, 124 ; Sulte, *Hist. Cana. Franç.*, IV, 149, 154; *Titres seigneuriaux*, I, 257-8.

[122] A ce mariage étaient présents Claude et Jacques de Joybert. L'un d'eux eut un fief près de Jemsec.

[123] *Documents sur la Nouvelle-France*, I, 189, 202, 212, 230, 243, 263, 266, 290, 299, 346, 578; *Conseil Souverain*, I, 531; *Titres seigneuriaux*, I, 257, 334, 400; Tanguay, I, 166; III, 283; Ferland, *Cours*, II, 79, 125; Richard, *Archives*, 1899, pp. 253, 494.

[124] *Titres seigneuriaux*, I, 128, 448; Tanguay, I, 194; Faillon, III, 240; Daniel, *Quelques contemporains*, p. 35; Ferland, *Cours*, II, 226, 277, 297, 299; *Conseil Souverain*, I, 525, 959, 963, 986, 971, 1003; Richard, *Archives*, 1899, pp. 262, 266, 290, 303, 303, 315, 315, 326, 326, 353, 357, 358, 358, 361, 361, 373, 449, 450, 452; P.-G. Roy, *Saint-Antoine-de-Tilly*, pp. 5-6; Doutre et Lareau, *Le Droit Civil*, p. 159.

[125] *Relation*, 1666, p. 6; Tanguay, *Répertoire*, 52; Langevin, *Mgr de Laval*, 73, 126; *Documents sur la N.-France*, I, 370, 400-1, 602; IV, 6, 12, 41, 51, 148, 155; Ferland, *Cours*, II, 125, 152, 217.

[126] *Titres seigneuriaux*, I, 11, 27, 275; Tanguay, I, 169, 318, 347; *Conseil Souverain*, I, 790, 796, II, 390; Daniel, *Grandes Familles*, p. 511.

[127] *Documents sur la Nouvelle-France*, I, 216; *Titres seigneuriaux*, I, 133; Margry, *Mémoires*, II, 252; Harrisse, *Cartographie*, XXV, 609-10; Faillon, III, 347, 467.

[128] La Mothe-Saint-Eraye, d'après la marquise de Créquy, I, 314.

[129] J.-E. Roy, *Seigneurie de Lauzon*, I, 91; *Conseil Souverain*, I, 633, 775, II, 165-7, 437, 592-3, 598, 602, 713, 840, 844; *Titres seigneuriaux*, I, 66; *Edits et Ordonnances*, II, 58, 85; Tanguay, I, 259; Sulte, *Hist. Canad. Franç.*, V, 54, 99.

[130] *Titres seigneuriaux*, I, 11; *Conseil Souverain*, I, 790, 796, II, 594, IV, 363; Girouard, *Supplément au Lake St. Louis*, 83, 87; Richard, *Archives*, 1899, pp. 314, 327, 342, 344, 348, 363; Ferland, *Cours d'histoire*, II, 343, 406; Tanguay, *Dictionnaire*, I, 193, 389, V, 375; *State Historical Society of Wisconsin*, VII, 102-8, X, 300, XI, 36, XII, 440.

[131] Dont 350 comptant—le reste à intérêt de 5 pour 100. La seule maison qui avait été bâtie sur l'île n'existait plus.

[132] *Titres seigneuriaux*, I, 86; *Conseil Souverain*, I, 570-71, 775, II, 195; Tanguay, I, 215; Huguet-Latour: *Histoire de l'ile Dupas*, 1867, pp. 7, 9.

[133] Leblond de Brumath, *Histoire de Montréal*, 1890, p. 149; Richard, *Archives*, 1899, p. 52; Faillon, III, 135, 151, 385-390, surtout ces dernières pages.

[134] Faillon, III, 338, 355; Girouard, *Lake St. Louis*, p. 72. Ce personnage n'est pas mentionné dans le dictionnaire Tanguay.

[135] Tanguay, I, 103, 380; *Conseil Souverain*, I, 800, 802, 848, 849, 863; Faillon, III, 338; Le Tac, pp. 194, 210; Bibaud, *Dictionnaire*, p. 71; Girouard, *Lake St. Louis*, 72, 100; Verreau, *Les deux abbés de Fenélon*, 44.

[136] Donc né en 1649. Il pouvait avoir été lieutenant en 1665, tel que le dit l'acte de mariage.

[137] Tanguay, *Dictionnaire*, I, 337; Faillon, III, 341; Girouard, *Lake St. Louis*, 72, 140, 142, 148, 210, 215; *Conseil Souverain*, I, 805, 811, 816, 833, 851, 858, 867, 869, 872, 877, 879, 1003.

[138] Girouard, *Lake St. Louis*, 36, 140-3, 151, 210, 215; *Supplément*, 39, 83, 88-91; *Anciens Postes du lac Saint-Louis*, p. 11; *Conseil Souverain*, I, 669, 811, 815, 833, 872; II, 745, 774, 799, 876; Tanguay, I, 161; Margry, *Mémoires*, I, 188; Faillon, III, 342; *Société Royale*, 1899, p. 99.

[139] *Conseil Souverain*, II, 872, 897, 937; Nicolas Perrot, 112-14; Tanguay, I, 185; *Relations*, 1665, p. 10; 1666, p. 7; *Journal des Jésuites*, pp. 338, 346, 348; Faillon, III, 136.

[140] Sa mère était Périnne de Chambellé, parente du maréchal de ce nom.

[141] De 1662 à 1672 les gouverneurs et les intendants n'accordaient que des permis d'occupation.

[142] Parrain, par procuration, François Dugué sieur de Fougère, lieutenant-colonel du régiment de Conti.

[143] *Titres seigneuriaux*, 59, 90, 127, 229, 278, 280; Faillon, III, 223, 340, 349; Tanguay, I, 209-10; Girouard, *Lake St. Louis*, 116, 141, 173-6, 208, 211; *Anciennes Côtes*, 27, 30.

[144] Tanguay, I, 217-18; Ferland, *Cours*, II, 163, 369; *Histoire de l'Hôtel-Dieu de Québec*, 1878, p. 354; Richard, *Archives*, 1899, p. 301.

[145] Peut-être était-ce son fils.

[146] Tanguay, I, 42; II, 221; *Titres seigneuriaux*, I, 273, 425, 446; La Potherie, I, 77; Ferland, II, 163, 213, 228, 289; Richard, *Rapport sur les archives*, 1899, pp. 301, 334, 342, 356.

[147] Tanguay, I, 33, 47, 87, 457, 494; II, 255. *Titres seigneuriaux*, I, 109, 134-5. *Conseil Souverain*, II, 960, 970, 981; IV, 129, 401, 407, 416. Bibaud, *Dictionnaire*, p. 39. *Bulletin des Recherches Historiques*, 1901, pp. 128, 155, 157; Garneau, I, 215; *Journal des Jésuites*, p. 334; Ferland, *Cours*, II, 163.

[148] Richard, *Archives*, 1899, p. 25; *Société Royale*, 1894, pp. 3-23.

[149] *Titres seigneuriaux*, I, 262; Nicolas Perrot, 138; Tanguay, I, 411.

[150] *Conseil Souverain*, I, 943; *Titres seigneuriaux*, I, 96, 269; Tanguay, I, 119, 131, 469, 554; Faillon, III, 206, 347; Sulte, *Pages d'Histoire*, 347.

[151] Greffe de Guillaume de La Rue, 1670; Tanguay, *Dictionnaire*, I, 20; P.-B. Casgrain, *Familles Baby, Casgrain*, p. 47.

[152] *Titres seigneuriaux*, I, 43; *Conseil Souverain*, I, 776, 956; Tanguay, I, 494; Langevin, *Mgr de Laval*, 165; Faillon, III, 345; *Bulletin des Recherches*, 1896, p. 62; 1902, p. 301.

[153] Ce nom existait en Languedoc, Basse-Auvergne et Basse-Guyenne, non loin de Castel-Sarrasin.

[154] *Titres seigneuriaux*, I, 122, 293; *Conseil Souverain*, II, 386, 863; Tanguay, I, 331.

[155] Tanguay, I, 68; II, 360; Girouard, *Lake St. Louis*, 72; *Titres seigneuriaux*, pp. 5, 294; Rameau, *La France aux Colonies*, II, 27; Sulte, *Hist. Canad. Franç.*, V, 37.

[156] Tanguay, I, 469; *Titres seigneuriaux*, I, 96.

LOUISBOURG EN 1902.

IV.—*Louisbourg en 1902.*

Par l'honorable PASCAL POIRIER.

(Lu le 27 mai 1902.)

L'impression que produit la vue des ruines de Louisbourg n'est pas la même chez tous les voyageurs. Cela se voit très bien aux physionomies.

L'Anglais, qu'il arrive de Toronto ou de Liverpool, regarde avec sérénité le sombre panorama, et trouve tout naturel que la citadelle française soit tombée, puisque l'Angleterre avait résolu de s'en emparer, et que le monde a été créé pour l'Angleterre.

L'Américain, agité, malgré ses efforts pour demeurer calme, trouve tout à fait étonnant que Louisbourg ait pu résister si longtemps, quand c'étaient Pepperrell et les troupes de la Nouvelle-Angleterre qui l'assiégeaient.

Le Français, après avoir, dans une rapide vision, vu passer devant ses yeux l'image de la forteresse réputée inexpugnable, regarde les amas de débris gisant à ses pieds, et se demande, avec l'amertune du prophète Jérémie pleurant sur les ruines de Jérusalem: "Comment est assise solitaire la ville autrefois pleine de peuple ? Toutes ses portes sont renversées: les chemins de Sion pleurent."

C'est qu'en effet des voix sortent des pierres que vous foulez; il y a des larmes au fond des casemates qui vous regardent avec leurs grands yeux caverneux; on entend encore distinctement des cris de victoire, mêlés à des cris de malédiction, éclater sur la cîme des bastions. Et ces voix, ces larmes, ces cris, se confondent avec la grande voix de l'océan, qui gronde éternellement aux pieds des murs de Louisbourg, rongés et entraînés dans l'abîme des flots.

Spectacle d'une infinie tristesse ! Le glas dont le tintement lointain gémit au-dessus du murmure confus de la mer, c'est le glas funèbre de la domination française en Amérique.

De la citadelle elle-même il ne reste plus qu'un amas de ruines, que le temps consume et couvre de sa poussière.

Bâti peu de temps après la signature du traité d'Utrecht (1713), qui cédait à l'Angleterre la Nouvelle-Ecosse proprement dite, ainsi que l'île de Terreneuve, Louisbourg fut, pendant près d'un demi-siècle, la forteresse la plus redoutable de toute l'Amérique. Elle gardait formidablement l'entrée du golfe Saint-Laurent, menaçait la nouvelle possession anglaise de l'Acadie, et inquiétait le commerce de la Nouvelle-Angleterre.

Son vaste port, ouvert à toutes les saisons, servait d'abri à la flotte, en même temps que de refuge aux corsaires de France et de Navarre, lesquels écumaient plus particulièrement les parages américains de l'Atlantique, au grand dommage des corsaires, forbans, flibustiers et autres marins de l'Angleterre et de ses colonies.

Les puritains de la Nouvelle-Angleterre résolurent de s'en emparer, pour la plus grande gloire de Dieu, par haine des papistes et dans les intérêts de leur commerce maritime.

Au printemps de 1745, ils levèrent 4,070 miliciens, qu'ils mirent sous la conduite d'un marchand, nommé William Pepperrell; lui adjoignirent un prêcheur de croisade sainte, le révérend Whitfield, en même temps qu'une bannière portant la devise: *Nil desperandum Christo duce*. et lancèrent le tout, avec accompagnement d'hymnes pieuses, contre l'imprenable forteresse française.

Celle-ci tomba, sans gloire, après quarante-sept jours de molle résistance.

Il est vrai que l'armée de Pepperrell avait été renforcée par une escadre anglaise, sous les ordres du commodore Warren, et que Louisbourg était défendu par Duchambon, le père du peu glorieux défenseur du fort Beauséjour, du Vergor.

Jours néfastes, et hommes plus néfastes encore, pour la France, que Dieu châtiait.

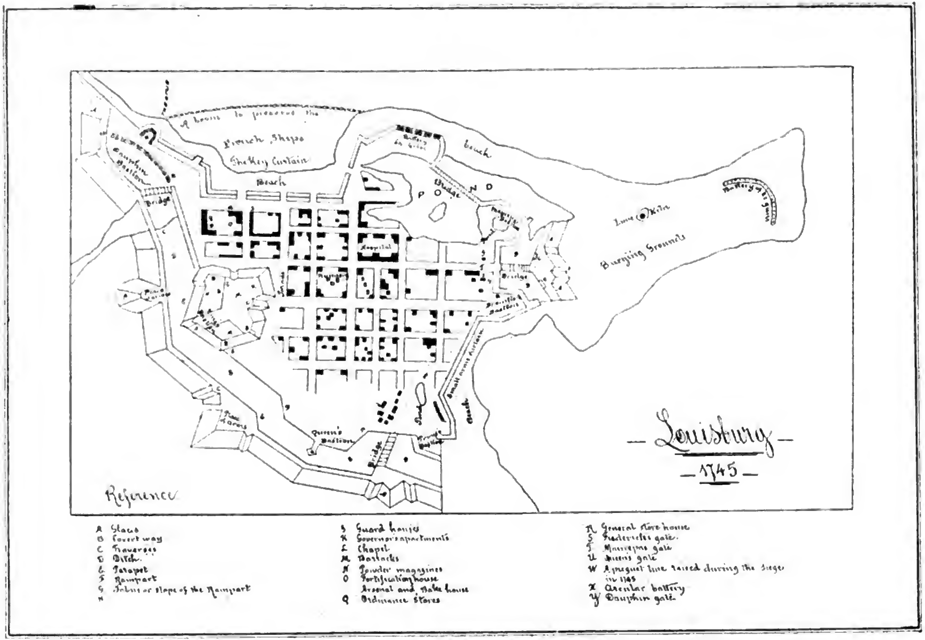
Trois ans après ce haut fait d'armes des milices du Massachussetts, le traité d'Aix-la-Chapelle restituait Louisbourg et le Cap-Breton à la France, et rétablissait toutes choses dans l'état où le commencement de la guerre les avait trouvées. Tel avait été le bon plaisir du roi très chrétien de France, Louis XV dit “ le Bien-Aimé ”, et de Georges II d'Angleterre, le “ Défenseur de la Foi ”.

La paix fut de courte durée, huit ans à peine, qui furent pour les colonies anglaises et françaises d'Amérique moins qu'une trève, et pour les Acadiens de la Nouvelle-Ecosse, une calamité plus dure que la guerre, puisque ce fut durant cette paix, en 1755, qu'eut lieu leur déportation violente de l'Acadie, le “ grand dérangement ”.

Les hostilités reprirent en 1756. Ce fut la guerre de Sept Ans, guerre fatale à la France et à ses colonies, qu'elle perdit toutes.

L'effort de l'Angleterre se porta simultanément contre toute l'immense frontière des possessions françaises, depuis Niagara jusqu'à Louisbourg. Pitt avait juré d'en finir pour toujours avec la France en Amérique; et ce que les Pitt, père et fils, juraient, une divinité amie se chargeait de l'accomplir.

Une flotte de vingt-deux navires de ligne, dix-huit frégates et deux brûlots, portant dix-huits cents canons, et de douze transports montés


A boom to preserve the
French Ships
Beach
Dauphin Bastion
Bridge
Battery de Grave
beach
P O
Bridge
N D
Hospital
Lime Kiln
Burying Grounds
Bridge
Queen's Bastion
Bridge
Louisburg
1745
Reference
A Glacis
B Covert way
C Traverses
D Ditch
E Parapet
F Rampart
G Talus or slope of the Rampart
H
I Guard houses
K Governor's apartments
L Chapel
M Barracks
N Powder magazines
O Fortification house
Arsenal and Bake house
Q Ordnance Stores
R General store house
S Fredericks gate
T Maurepas gate
U Queens gate
W A picquet line raised during the siege in 1745
X Circular battery
Y Dauphin gate

par douze mille hommes de débarquement, mouilla, le 3 juin 1758, dans la baie de Gabarus, à deux petites lieues de Louisbourg.

L'amiral Boscowan commandait la flotte et le général Amherst, l'armée.

Les brigadiers-généraux Wolfe, Lawrence et Whitmore commandaient en second.

Louisbourg avait deux mille neuf cents hommes de troupes régulières et quelques cents miliciens et sauvages à opposer aux assiégeants. Dans la rade se trouvaient cinq vaisseaux de ligne et six frégates, avec environ cinq cents canons. Les murs et les batteries de la ville étaient armés de deux cent trente-six canons et mortiers.

Le chevalier Drucour commandait la place.

Malheureusement pour lui et les siens, les murailles étaient en mauvais état de réparations: le roi, ses courtisans et ses maîtresses avaient besoin de tous les revenus du royaume pour leurs menus plaisirs. Il n'en restait plus pour Québec et pour Louisbourg.

Après une défense de près de deux mois, l'une des plus héroïques, avec celle de Québec par Frontenac, et après celle de Port-Royal par Subercase, dont les annales françaises d'Amérique fassent mention, Louisbourg, le Gibraltar, le Dunkerque du Nouveau-Monde, tomba au pouvoir des Anglais.

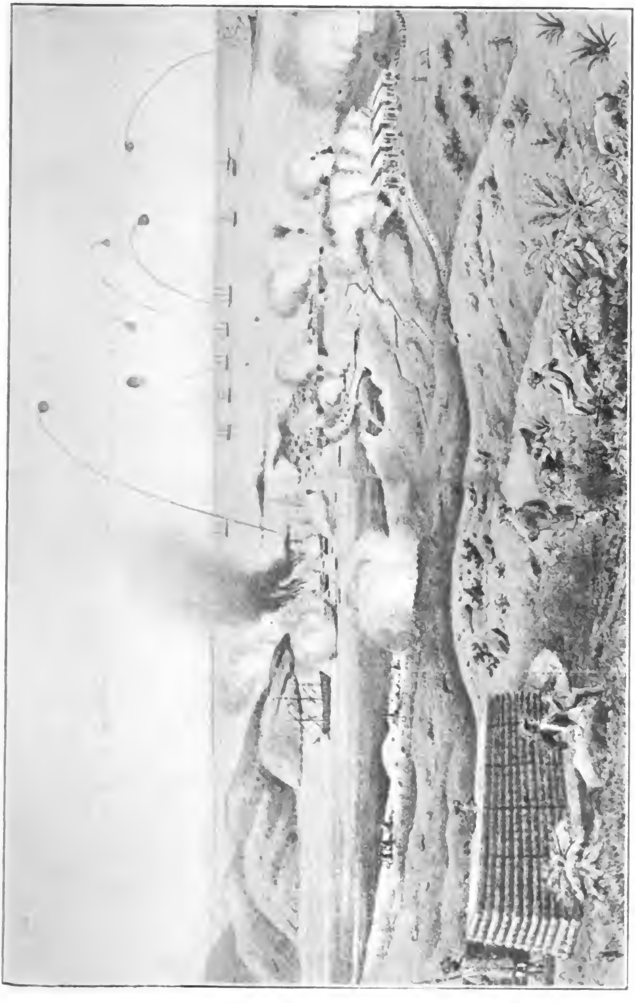
Quand, le 27 juillet 1758, les clefs de la ville furent remises à Amherst et à Boscowan, les murs de la citadelle, percés à jour, croulaient de toutes parts; les obus et le feu avaient détruit la plupart des édifices publics, et tous les vaisseaux de la rade avaient été coulés à fond, ou brûlés.

Les officiers et les soldats de la garnison furent transportés en Angleterre, et ceux des habitants de la ville qui n'avaient pas porté les armes, à la Rochelle.

Les murailles furent rasées de fond en comble, à la manière antique. On aurait pu y passer la charrue et y semer du sel.

Les travaux de démolition durèrent près de deux ans, dit-on; et tout ce que la poudre, le fer et la main des hommes put atteindre fut démoli, rasé jusqu'au sol et jeté dans les fossés. Il ne resta que les assises des bastions, des murailles et de quelques édifices publics, et sept abris et casemates du bastion du Roi, dont quatre, maintenant béants et percés à jour, sont à la veille de s'effondrer.

Les trois autres, situés en face et mieux conservés, donnent une idée exacte de ce qu'étaient ces retraites, où s'entassaient les femmes et les enfants, pendant que les bombes, les obus, les boulets froids et rouges tombaient comme une pluie d'enfer sur la malheureuse ville vouée à la destruction.



LE SIÈGE DE LOUISBOURG, 1758.
(Dessin du lieutenant Thomas Davies, A.R., fait durant le siège.)

Les blessés et les malades étaient logés à l'hôpital de Saint-Jean-de-Dieu, grand édifice situé à l'autre bout de la ville, du côté de la pointe Rochefort.

Les fortifications, d'une demi-lieue de circuit, avaient la forme d'un quadrilatère irrégulier.

Murailles, bastions, demi-bastions, escarpes et contre-escarpes, étaient dans le meilleur style de Vauban, et avaient coûté au gouvernement français la somme énorme de trente millions de livres tournois. La livre était d'environ vingt sous, où d'un peu moins d'un franc d'aujourd'hui.

Une bonne carte à la main, il est assez facile de reconstituer l'ancienne forteresse, et d'en suivre tout le circuit.

A l'extrémité ouest de la rade, donnant sur le Barachois et les Hauteurs-Vertes, se trouvaient le bastion du Dauphin, une batterie circulaire et la porte principale de la ville.

Le bastion du Roi, le plus formidable de tous, attenait au bastion du Dauphin, et renfermait l'arsenal, les casernes, les appartements des officiers, le château du gouverneur, la chapelle et les casemates. C'était en vérité la citadelle. Puis venaient successivement, en contournant l'enceinte dans la direction du Cap Noir: le bastion de la Reine, presque aussi formidable que celui du roi et faisant face à la mer; le bastion de la Princesse, à l'extrémité sud, entre le Cap Noir et la pointe Rochefort, et défendant de sa batterie les approches du port; les demi-bastions Bourillon et Maurepas, l'un pointant ses canons au sud de la pointe de Rochefort et des îles; l'autre, au nord, couvrant de ses feux l'entrée de la rade et l'intérieur du port.

Les Anglais appelèrent cette dernière batterie la batterie du diable, à cause de l'impossibilité où ils furent de la réduire au silence.

Sur la rade même, à l'intérieur, qu'elle couvrait du rayonnement de ses canons, se dressait la formidable batterie de la grève. Des exhaussements en terre la reliaient au bastion du Dauphin, à l'ouest; et deux ponts de bois jetés sur un étang, au bastion Maurepas, du côté du sud.

Ces sept bastions et cette batterie formaient le pourtour des fortifications de Louisbourg, fortifications que madame de Pompadour, de vertu peu farouche, estimait imprenables.

Il convient d'ajouter à ces puissants engins de défense deux autres batteries, montées à grand frais, et garnies des plus grosses pièces de la place: la batterie de l'Ile et la Grande Batterie, ou batterie Royale. L'une, la batterie de l'Ile, était placée sur un rocher, à l'entrée même de la rade, dont elle défendait l'accès. Elle prit une part glorieuse à la défense de la ville, tant en 1745 qu'en 1758.

L'autre, sise au fond du port, côté ouest, à mi-chemin entre le vieux et le nouveau Louisbourg, devait arrêter la marche des troupes de débarquement opérant du côté de la baie de Gabarus, et couvrir, de ce côté-là, les approches de la citadelle.

Elle se couvrit d'ignominie, à l'un et à l'autre siège, et n'arrêta que le tir de ses propres canons, dès que les couleurs anglaises se montrèrent sur les Hauteurs-Vertes.

Un tas informe de pierres, qu'on aperçoit sur la grève, près de la nouvelle église catholique, quand on se rend, par l'ancien chemin des Français, de l'une à l'autre ville, c'est tout ce qui reste de cette batterie royale, aussi peu glorieuse que le royal personnage lui-même, Louis XV, dont elle portait le nom.

Les fortifications de Louisbourg, avec leurs glacis et les approches, couvraient à peu près tout le terrain compris à l'est d'une ligne tirée du Cap Noir au Barachois, c'est-à-dire toute la langue de terre qui sépare le fond de la rade de l'océan, à l'exception, cependant, de la pointe de Rochefort et du cimetière, à l'est, soit environ cent arpents en dedans des murs et autant en dehors. Le terrain est de peu d'élévation.

Le coup d'œil qu'offrent ces ruines est encore imposant par sa sauvage grandeur et sa désolation.

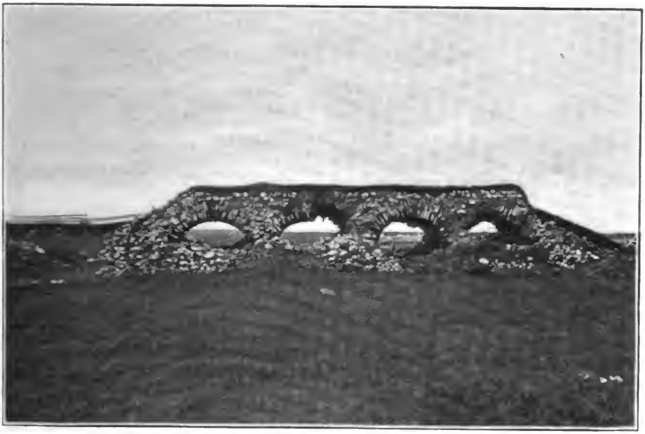
Devant vous c'est la mer, l'immense mer, toujours agitée, toujours irritée. Un rideau d'écume blanchissante montant des brisants, des îles de l'Entrée et des contre-forts du Cap Noir, s'étend jusque sous vos pieds.

Quelque chose de courroucé plane sur ces sombres récifs qui ont vu par deux fois tomber la forte citadelle, et avec elle s'écrouler la domination d'un grand empire en Amérique.

Oh ! qu'il est à plaindre le vaisseau pris dans une de ces épouvantables tempêtes qui labourent en sillons écumants les côtes de l'Atlantique, s'il vient à toucher l'un de ces redoutables récifs !

Debout, sur le bastion de la Reine, vous avez devant vous, au sud, un terrain plat, inculte, marécageux, se prolongeant jusqu'à la mer; un peu plus à l'est, presque en ligne du bastion de la Princesse, vous voyez une arrête saillante. C'est le Cap Noir, énorme rocher vert-sombre, d'où les Français tirèrent la plus grande partie des assises des murailles et des bastions de Louisbourg. Ils en avaient coupé la moitié verticalement et se préparaient à le raser tout à fait, quand la conquête anglaise vint les surprendre. On voit encore les trous énormes des forêts. L'amas de pierres brunâtres laissées sur place et entassées soigneusement suffirait seul à recommencer la reconstruction de la forteresse.

A l'ouest une anse, une baie. C'est l'anse de la Cormorandière, la baie de Gabarus, où les Anglais vinrent deux fois débarquer une



CASEMATES, 1902.

ENTRÉE DE LA RADE DE LOUISBOURG.

armée d'assiégeants. Entre cette baie et la forteresse, le contour du littoral est coupé par deux indentures, la pointe Plate, à une lieue de vous, environ, et, plus près, la pointe Blanche. Au delà, c'est l'immense océan bleu.

Après la citadelle et le port, c'est le côté est de Louisbourg qui attire le plus le regard. Vous voyez, d'abord, un bras de terre qui s'avance et arrête les vaisseaux au passage. C'est la pointe de Rochefort, où se trouve l'ancien cimetière. Un peu plus loin, de noires surrections, des rocs, des écueils et trois ilôts: Green Island, Rock Island et Goat Island, ou, pour appeler cette dernière de son nom français, l'île de l'Entrée. C'est sur cet ilôt qu'avait été placée la grande batterie destinée à protéger l'entrée de la rade. Celle-ci, large d'un peu plus d'un demi-mille, offre un passage facile et sûr aux vaisseaux de toutes dimensions, grâce à son chenal profond, dont l'île de l'Entrée et la pointe du Phare (ou tour de la Lanterne) forment les deux berges opposées.

Les deux pointes que vous apercevez, coupant la ligne du rivage, de l'autre côté de la Tour de la Lanterne, c'est la Lorraine des Anglais, laquelle fut le Lorembec ou le Norambègue des Français et des premiers découvreurs. Celui qui pourra trouver la véritable origine de ce nom, donner la vraie étymologie de ce mot, dire, preuves en mains, s'il est sauvage, esquimau, scandinave, basque, allemand ou vieux français, aura pénétré plus avant dans les ténèbres historiques de notre Amérique que ne l'a fait aucun historien connu.

Plus loin encore, dans l'est, en suivant la ligne du rivage, s'estompe à perte de vue la Baleine. C'est là qu'Ochiltree, durant la première occupation anglaise de l'Acadie, construisit, en 1629, un fort, que le capitaine Daniel vint lui enlever. Si l'on en excepte l'essai de colonisation de Fagundez et des Portugais, au commencement du siècle précédent, ce fort de Lord Ochiltree est le premier établissement européen qui ait été tenté au Cap-Breton.

Dans la même direction, on peut apercevoir aussi l'île de Puerto-Novo, sise en face de l'antique "Cap des Bretons", lequel a donné son nom à toute la contrée. C'est, l'île de Scatarie et la pointe de l'île de Sable exceptées, le point le plus oriental de tout le Canada.

La disposition intérieure de ce qui fut la ville de Louisbourg n'est plus guère reconnaissable, au milieu du gazon qui recouvre les terre-pleins, et parmi les amoncellements de pierres et de débris qui jonchent les fossés, les murailles et les emplacements des principaux édifices. Il faut un guide pour s'y reconnaître; et Louisbourg, grâce au ciel, en possède un des plus recommandables dans la personne du capitaine Patrick Kennedy, typique scion de la verte Irlande.

Il vous conduit d'abord, car il est bouillant catholique, à l'endroit où s'élevait la chapelle du gouverneur, au centre même du bastion du Roi. On a sous les yeux le tréfonds remué d'une fondation qui est bien celle où s'élevait, autrefois, en style élégant, la chapelle du gouverneur, laquelle servait au besoin d'église paroissiale ; mais c'est absolument tout ce qu'il en reste. Pas une seule de ces belles pierres de taille, que les vaisseaux du roi très chrétien apportaient de France; pas même une brique rouge ou blanche, intacte. Tout a été fouillé, tout a été dispersé, tout a été enlevé, tout a été vendu.

Les marchands anglais de Halifax et du Nouveau-Louisbourg ne nourrissent pas de préjugés à l'endroit des briques et des pierres de taille. Celles qui ont servi au culte papiste ont à leurs yeux autant de valeur, pourvu qu'elles soient belles et bien conservées, que celles qui auraient été destinées à des usages purement profanes; et, comme le capitaine Patrick Kennedy, propriétaire par droit de prescription du bastion du Roi et d'une assez forte étendue de terrain adjoignant, est lui-même, à ses heures, d'une casuistique accommodante, il en est résulté que les briques et les pierres de taille de l'ancienne chapelle du gouverneur ont pris le chemin de Halifax et du Nouveau-Louisbourg, et que le prix honnête de ces matériaux enlevés au culte orthodoxe, est tombé dans l'escarcelle de l'heureux propriétaire *intra muros*.

Le capitaine vous fait voir aussi l'emplacement des casernes, du château du gouverneur, de l'arsenal, du couvent, de l'hôpital; mais tout ce fouillis n'est, en définitive, que des rangées de pierres brunes, dont les plus belles ont été trillées et emportées.

Tous les matériaux de quelque valeur, la pierre de construction, une pierre verdâtre, provenant du Cap Noir, à quelques cents mètres au sud du bastion de la Princesse; la pierre d'ornementation, un calcaire blanc, apportée à grand frais de France; des quantités incroyables de briques plates d'un rouge hématite, et fermes comme du fer, aussi de provenance française, ont été pillées, depuis un siècle et demi, par les vandales de Terreneuve, des Etats-Unis et de la Nouvelle-Ecosse, et employées à la construction de quais, d'édifices publics et de maisons privées.

Halifax en a enlevé la plus grande partie; des navires venaient de très loin en prendre des cargaisons; la nouvelle ville, le New-Louisburg, en a construit toutes ses caves, toutes ses cheminées, tous ses soubassements, et, dernièrement, la *Dominion Coal Company,* les piles et les culées d'un immense débarcadère.

Cette année encore, il a été vendu une dizaine de mille briques, à raison de neuf dollars le mille ! Pour en arriver à ce brillant résultat commercial, on a retourné, refouillé, regratté les pierres et disloqué ce qui restait des antiques fondations.

Vue prise sur le golfe.

Deux vieux puits retrouvés, l'été dernier, sous des décombres, ont eu leur maçonnage enlevé et vendu.

En pratiquant une de ces fouilles, où ni l'archéologie, ni la numismatique n'ont rien à voir, l'un des neuf propriétaires du fort a découvert, tout récemment, un passage souterrain, apparemment inachevé, creusé en-dessous du bastion de la Reine, et débouchant en dehors des murs, du côté de la mer.

Ces sorties secrètes, imitées de celles que pratiquaient sous leurs castels les seigneurs féodaux, et qui pouvaient servir à bien des fins diverses, rappellent douloureusement à la mémoire que Duchambon, le contemporain de l'intendant Bigot, était gouverneur de Louisbourg, en 1745, quand les fortifications de la ville tombèrent sous la récitation des *tracts* bibliques des prédicants et sous le bruit des canons iconoclastes des puritains de la Nouvelle-Angleterre, avec à peu près la même facilité que les murs de Jéricho s'écroulèrent par la vertu des trompettes de Josué et des cris des Hébreux.

Bigot lui-même géra, durant quelques années, les finances de la ville, en qualité de commissaire-ordonnateur, faisant, à Louisbourg, l'apprentissage des méthodes qu'il devait perfectionner à Québec, de compte à demi avec la très Haulte et très Honorée Madame de Pompadour.

A des hommes comme Duchambon et Bigot, une sortie secrète n'était pas une précaution inutile. Il est permis de rattacher celle du bastion de la Reine à l'un ou à l'autre de ces deux noms peu glorieux de notre histoire.

Il va sans dire que tous les objets de quelque valeur, trouvés dans les ruines de la forteresse, ont depuis longtemps suivi le chemin des briques rouges et des calcaires blancs. Or, il en a été trouvé de grandes quantités, parmi lesquels de très précieux. Mon hôtesse, au Nouveau-Louisbourg, m'a montré une grande cuiller en argent massif, parfaitement conservée, portant un monogramme que mon ignorance de ces sortes de chiffres ne m'a pas permis de lire, et qu'elle avait ramassée elle-même dans quelque décombre. De vieilles armes et de vieilles monnaies sont aussi souvent déterrées. Tous ces trésors ont disparu et continuent à disparaître.

Après la forteresse, la flotte. On ne compte plus le nombre des canons retirés des vaisseaux français, coulés dans le port.

A tant la livre de cuivre ou de vieux fer rouillé, chaque canon rapporte à son plongeur un joli denier. Ceux de cuivre rapportant davantage, la recherche en est poursuivie avec une persévérance toute systématique, qui laisse entrevoir le jour prochain où il n'en restera plus aucun dans les eaux du port.

C'est avec un fragment de l'un de ces canons, tiré du *Prudent*, que les Bostonnais des "Guerres Coloniales" coulèrent, en 1895, la médaille commémorative du cent-cinquantième anniversaire de la prise de Louisbourg par Pepperrell et Warren. Car ce ne sont pas seulements les pierres et les briques, les boulets et les canons, qui disparaissent sous la main des vandales, le sol lui-même, les fortifications elles-mêmes sont escamotées, nous échappent, passent en des mains étrangères.

Donc, la "Société américaine des Guerres Coloniales", dont le siège principal est à Boston, ayant résolu de commémorer, par l'érection d'un monument idoine, le cent-cinquantième anniversaire du plus grand fait d'armes dont se glorifient les milices de la Nouvelle-Angleterre, à savoir la prise de Louisbourg, en 1745, se fit concéder par le capitaine Kennedy l'endroit du bastion du Roi, où le général Pepperrell, en présence des deux armées, reçut du gouverneur Duchambon les clefs de la ville. C'est le site le plus en vue de l'antique citadelle.

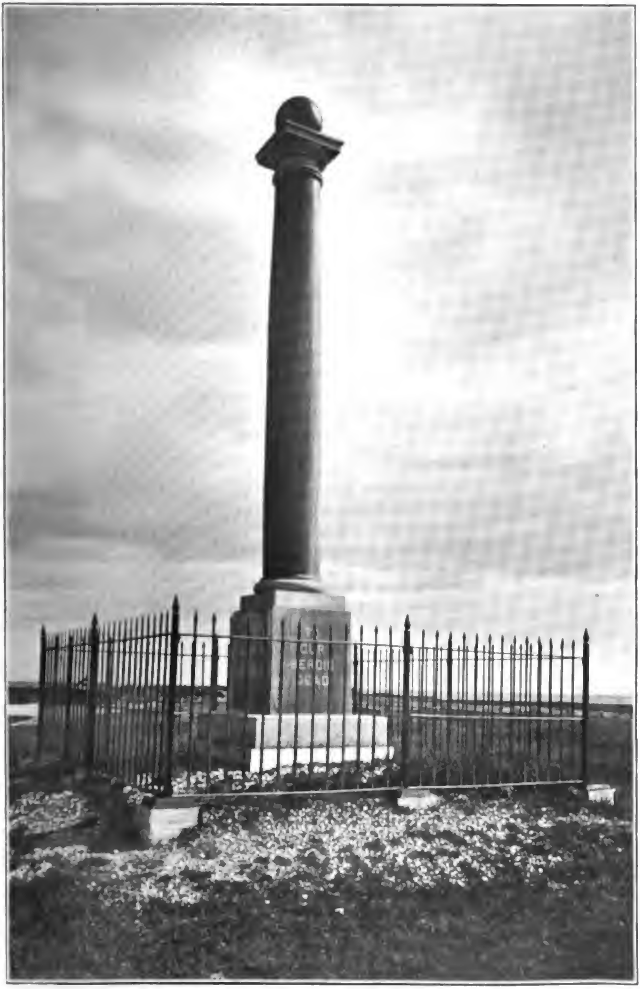
La dédicace eut lieu le 17 juin, 1895, à Louisbourg même, en présence d'une multitude de délégués américains, tous plus ou moins membres de la "Société des Guerres Coloniales", du lieutenant-gouverneur et des membres du cabinet de la Nouvelle-Ecosse, d'un *man-of-war* anglais, de hauts dignitaires britanniques, et consista dans la dédicace d'une colonne commémorative en "granit dorique", surmontée d'un boulet de canon, portant, gravé, le millésime: *1745*.

Des inscriptions appropriées et convenables se lisent sur les quatre faces de la base.

La colonne elle-même, avec son *boulet* phrygien, est dépourvue d'élégance; mais les discours qui en accompagnèrent la dédicace furent tous, au point de vue international, d'une correction parfaite: la "Société des Guerres Coloniales" recrute ses membres parmi les citoyens les plus distingués et surtout les plus instruits de la république américaine.

Ni le gouvernement fédéral, ni celui de la province ne s'émurent de cette prise de possession du vieux Louisbourg par une corporation étrangère: ils n'y virent, et il n'y a là possiblement nulle cause d'alarmes. Le cabinet de Halifax, toujours complaisant, poussa même la gracieuseté jusqu'à confirmer le titre de concession obtenu du capitaine Kennedy par la "Société". Monsieur le Bourgeois Gentilhomme pouvait-il trop faire pour Monsieur le Marquis, qui lui faisait l'honneur de lui emprunter ses écus ?

Bref, après que l'honorable lieutenant-gouverneur de la Nouvelle-Ecosse eut fait le dévoilement de la colonne au nom du gouverneur-général du Canada, lequel est le représentant direct de la couronne anglaise en ce pays; que de très éloquents et de très nombreux discours



Monument commémoratif.

eurent été prononcés, ou comme ils disent en anglais "délivrés", le commandant des troupes de Sa Majesté estima d'un heureux auspice cette fraternité d'armes, renouvelée de celle de 1745, qui ramenait sous les murs de Louisbourg, dans une étreinte dont les liens du sang faisaient la force, les marins invincibles de la vieille Angleterre et les miliciens invaincus de l'Angleterre nouvelle.

Il n'y eut guère d'enthousiasme; mais l'amiral anglais, le lieutenant-gouverneur de la Nouvelle-Ecosse, tout le monde, enfin, sentirent qu'il venait de se cimenter là une éternelle alliance entre les forces maritimes et militaires du Royaume-Uni d'Angleterre et d'Irlande et celles des Etats-Unis d'Amérique.

D'un autre côté, des esprits moroses se demandaient, durant ces édifiants ébats entre frères, autrefois d'armes, comment serait reçue, dans la grande république étoilée, une société de guerres anglaises ou canadiennes, qui s'en irait planter chez eux une colonne commémorative quelconque de quelque victoire à nous sur l'un de nos ennemis ?

Pris en 1745 par les Américains et les Anglais; repris en 1758 par les Anglais seuls, Louisbourg vient d'être, en 1895, recapturé en partie par les Américains.

Espérons que, mis en appétit, ils ne reviendront pas réclamer le reste de la vieille citadelle par la voix de leurs canons.

Mais l'histoire a parfois de bien surprenantes répétitions ! . . .

Lorsque, en 1876, je visitai Louisbourg pour la première fois, il n'y avait que deux ou trois maisons, d'assez misérable apparence, sur les vieilles ruines de la ville. Quelques brebis et de rares bestiaux paissaient parmi les décombres; et les casemates de la citadelle, mieux conservées qu'aujourd'hui, leur servait d'abri durant les nuits d'orage.

Tous, hommes et bêtes, me parurent ennuyés, accablés, de vivre au milieu de ces ruines monotones, et ne rien tant souhaiter que de changer d'habitation. Le souvenir des deux sièges semblait peser sur leur existence.

Aussi je me flattais, à mon dernier voyage, de pouvoir, au moyen d'arrangements de part et d'autre satisfaisants, obtenir des occupants actuels une promesse de vente à prix raisonnable, une honnête "option", heureux qu'ils seraient, sans doute, moyennant amples dédommagements, de s'en aller vivre ailleurs.

Ceci, d'ailleurs, entrait dans le cadre de la mission que m'avait confiée la Société Royale, d'aller examiner sur place l'état présent de la forteresse de Louisbourg, dans le dessein d'en recommander l'achat au gouvernement fédéral, pour en faire un parc, ou, en tous cas, une propriété publique.

Les ministres du cabinet provincial, que j'étais allé consulter préalablement, s'étaient montrés tout-à-fait disposés à seconder les efforts de la Société Royale, et à coopérer même, dans une certaine mesure, avec les autorités fédérales dans un aussi patriotique et louable projet. On sentait percer chez eux un certain regret d'avoir assisté indifférents à tant de vandalisme inintelligent; d'y avoir même un peu contribué, quoiqu'ils rejetassent avec violence tout le blâme sur leurs prédécesseurs politiques en exercice.

Le fait est que libéraux et conservateurs ont montré la même incurie à l'endroit des sites historiques de la Nouvelle-Ecosse, et l'on pourrait très bien leur appliquer, aux uns et aux autres, en le modifiant légèrement, le vers connu de Pope:

The Torys finished what the Grits began.

et vice-versâ.

Or, il est arrivé ce à quoi j'aurais dû m'attendre, en ce commencement de siècle essentiellement progressif, dans un coin du Dominion particulièrement enfiévré de mouvement: j'étais devancé!

La *Cape-Breton Railway Co.* avait pris mon option !

Cette entreprenante compagnie est à construire, avec une charte canadienne et des capitaux américains, une ligne de chemin de fer reliant le détroit de Canso — ancien passage Fronsac — avec Louisbourg et Sydney, en passant par le canal Saint-Pierre.

C'est une ligne rivale de l'*Intercolonial*, dont le terminus est à Sydney.

Sydney, les deux Sydney, sont aujourd'hui des villes considérables, et compteront demain, peut-être, grâce aux hauts fourneaux, aux forges, aux aciéries que la *Dominion Steel Company* et la *Nova Scotia Steel Company* y construisent, ou sont à la veille d'y construire, parmi les plus importantes de toutes les provinces maritimes.

Le gouvernement canadien a choisi Sydney pour terminus de son chemin de fer. Les Américains ont pris Louisbourg. Le temps pourrait bien donner raison à ceux-ci.

Au surplus, ils sont en frais de se rendre acquéreurs du reste de la vieille forteresse, de nous subtiliser le site historique le plus fameux, avec Québec, de toute l'Amérique. C'est peut-être un mal pour un bien ; et nous pourrions, en définitive, avoir des actions de grâces à leur rendre; car enfin il vaut encore mieux que ce qui reste de Louisbourg soit préservé par des marchands, que dilapidé par des Ostrogoths.

Les papiers passés entre la compagnie du chemin de fer et certains des neuf occupants du site de Louisbourg sont apparemment réguliers, et les titres valables: la prescription s'établissant contre le gouvernement anglais par une occupation ininterrompue de soixante ans. Or,

ACIÉRIES DE SYDNEY.

FORT ANNAPOLIS (ANCIEN PORT-ROYAL), 1902.

quelques-uns de ces *squatters* prétendent à une occupation de cent-vingt ans et plus.

Mais il y a lieu de se demander où le gouvernement de la Nouvelle-Ecosse, pour faire des m'amours à ses amis de Boston, prend l'autorité qu'il se donne de confirmer ces titres, et, au besoin, d'en décerner de nouveaux ?

C'est que le titre primitif, le titre légal, le *fee* anglais du site où s'éleva Louisbourg réside toujours dans la couronne britannique, qui ne s'en est jamais dessaisi.

A la suite de correspondances échangées entre Londres et Ottawa, le gouvernement anglais, dans un arrêté du Conseil daté du 18 août 1882, transféra au gouverneur-général du Canada les terres d'ordonnance et les propriétés militaires impériales de la Nouvelle-Ecosse, entre autres les vieux forts de Lunenburg, de Windsor et d'Annapolis, l'ancien Port-Royal des Français.

Mais il n'y eut jamais de translation du vieux Louisbourg, ni en faveur du gouvernement fédéral, ni encore moins en faveur de celui de la Nouvelle-Ecosse. Il est encore aujourd'hui une propriété impériale.

Il nous est donc encore possible de rentrer en possession de Louisbourg; car la *Cape Breton Railway Co.* n'a pas ratifié tous les termes de son option avec les occupants du site; il s'est contenté du terrain longeant le rivage, dont il fera le terminus extrême de son chemin de fer.

L'intérieur des fortifications, les bastions, les casemates, la pointe Rochefort, le Cap Noir, les glacis, les fossés, le cimetière, restent encore intacts: le tiers de tout le terrain relevant des *squatters* demeurant toujours la propriété du gouvernement impérial.

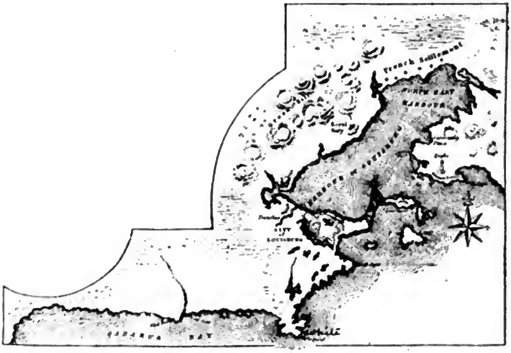
Un grand avenir semble réservé à Louisbourg et au "Fort-Louisbourg." C'est ainsi que les habitants désignent la nouvelle et l'ancienne ville.

On conçoit que ce n'est pas sans de très sérieuses raisons que le gouvernement français, généralement si sûr dans le choix du site de ses villes et de ses ports, au Nouveau-Monde, a préféré Louisbourg au Port-Dauphin, aux deux Sydney, à Inganiche, à Miré, à Saint-Pierre, pour y élever sa forteresse royale. Au point de vue purement militaire, Louisbourg, avec, à proximité, la baie de Gabarus, d'un atterrage facile; avec les Hauteurs-Vertes et d'autres élévations de terrain à portée de canon des murs, et d'où un ennemi peut tirer presque à feu plongeant sur la ville, prête plutôt sérieusement à la critique.

Ce n'est pas non plus la fertilité de son sol qui lui a valu la préférence. Sauf au fond, et du côté ouest de la baie, le pourtour du havre est impropre à l'agriculture, et les alentours en sont ou rocheux ou marécageux. La pittoresque et sauvage beauté du site n'aurait pas non plus suffi à déterminer le choix du gouvernement: il s'agissait d'une entreprise bien trop considérable.

Quels avantages prépondérants les ingénieurs et les officiers militaires de la cour de Versailles ont-ils donc trouvés à Louisbourg, ou plutôt au Port-à-l'Anglais, puisque le havre s'est appelé de ce nom fatidique, jusqu'à la fondation de la ville, vers 1721, pour le préférer à tous les autres ports du Cap-Breton ?

La supériorité incontestable de sa rade.



VUE D'ENSEMBLE, 1758.

Louisbourg est ouvert à la navigation durant les douze mois de l'année. Si quelque forte gelée y étend un pont de glace, la marée du lendemain la brise.

Les glaces du golfe, que les vents du nord-est et de l'est engouffrent, parfois, le printemps, dans les ports de Lingan, de Miré, de Sainte-Anne, de Sydney, qu'elles bloquent durant des semaines et même des mois entiers, passent au large de Louisbourg: l'île de Scatarie, celle de Puerto-Novo et les courants les en tiennent éloignées. Les banquises de l'Atlantique n'y arrivent guère, non plus, interceptées qu'elles sont par l'île de Terreneuve. Si des tempêtes exceptionnelles y poussent quelques glaçons, le courant les en éloigne aussitôt. Les ports rivaux ne jouissent pas de la même immunité.

La vue, du haut de l'ancienne forteresse, et particulièrement du haut du bastion du Roi, embrasse toute l'étendue du port.

Sa forme est celle d'une ellipse allongée, dont l'axe court du sud-ouest au nord-est. Les bords en sont réguliers et nettement accusés, et sa circonférence est d'environ deux lieues. Eau très profonde et bon ancrage partout. C'est une de ces rades que les Anglais appellent *land-locked,* c'est-à-dire encerclées de tous côtés, sauf à l'entrée. L'entrée de Louisbourg, munie des phares électriques modernes, peut facilement devenir l'une des plus sûres du monde entier. L'abri est parfait, à l'intérieur, principalement vers le fond, du côté du nord-est, et à l'endroit où s'élève aujourd'hui la ville nouvelle. Le vent n'y arrive que par-dessus les hauteurs environnantes.

C'est au fond de la rade, du côté ouest, que se trouvait le groupe de Français qui ne résidaient pas au-dedans du fort. Ils y faisaient un peu de culture, autant que le permettait un sol ingrat et rocailleux.

C'est aussi là que s'élève aujourd'hui la nouvelle ville, celle que les Anglais appellent Louisbourg tout court.

Le Louisbourg d'aujourd'hui, éloigné de près d'une lieue de l'antique forteresse, n'est pas non plus le Louisbourg d'il y a vingt ans. Celui-ci était situé du côté est de la rade, presque au fond, au lieu même où un vieux quai, datant de l'occupation française, achevait de s'écrouler.

Une compagnie houillière y avait construit un débarcadère, où les navires venaient prendre le charbon que voiturait, des mines éloignées d'environ quatre lieues, mines déjà connues, sinon exploitées du temps des Français, un chemin de fer abandonné depuis.

Un petit Louisbourg, deuxième du nom, s'était formé dans le voisinage du quai. Il vient d'être déserté tout à fait au bénéfice de la nouvelle ville: question de survivance pour le plus apte.

La nouvelle ville, dont la population s'élève à plus d'un millier d'âmes, est déjà munie d'une charte municipale, d'édiles, d'un maire[1] et de tout ce qui fait le juste orgueil des municipes canadiennes. Elle vit, elle palpite dans l'anticipation des grandes destinées qui l'attendent.

Lorsque le *Cape-Breton Railway,* un peu plus court que l'*Intercolonial,* sera terminé; que le pont projeté sur le détroit de Canso sera construit, Louisbourg se trouvera en communication directe avec Montréal, New-York et les autres grands centres américains.

Déjà un excellent chemin de fer le relie avec Sydney, parcours d'environ quarante milles.

---

[1] M. Levatte, à l'obligeance de qui je dois beaucoup de renseignements. J'ai aussi bénéficié des connaissances historiques très étendues du Révérend Monsieur Draper, Recteur de Saint-Bartholemée, l'une des figures les plus sympathiques du clergé anglican du Canada. C'est de lui que je tiens le croquis du lieutenant Davies, reproduit plus haut.

Le fait suivant démontre bien la supériorité du havre de Louisbourg sur celui des deux Sydney. Durant plusieurs mois de l'hiver, au temps des glaces, le *Dominion Steel*, le *Dominion Coal* et d'autres compagnies encore, font décharger leurs navires à Louisbourg, quitte à se servir du chemin de fer pour rendre les frets à destination, soit à Sydney soit ailleurs.

Comme Louisbourg est, de tous les ports canadiens, le plus oriental, le plus à proximité des grands bancs de pêche de Terreneuve, et surtout le plus rapproché de l'Angleterre, la ville peut tout attendre de l'avenir. Québec et Louisbourg, les deux grandes forteresses françaises, sont destinées par la nature à devenir, entre les mains du peuple commercial le plus prodigieux que le monde ait vu, deux centres de distribution, deux villes de première importance.

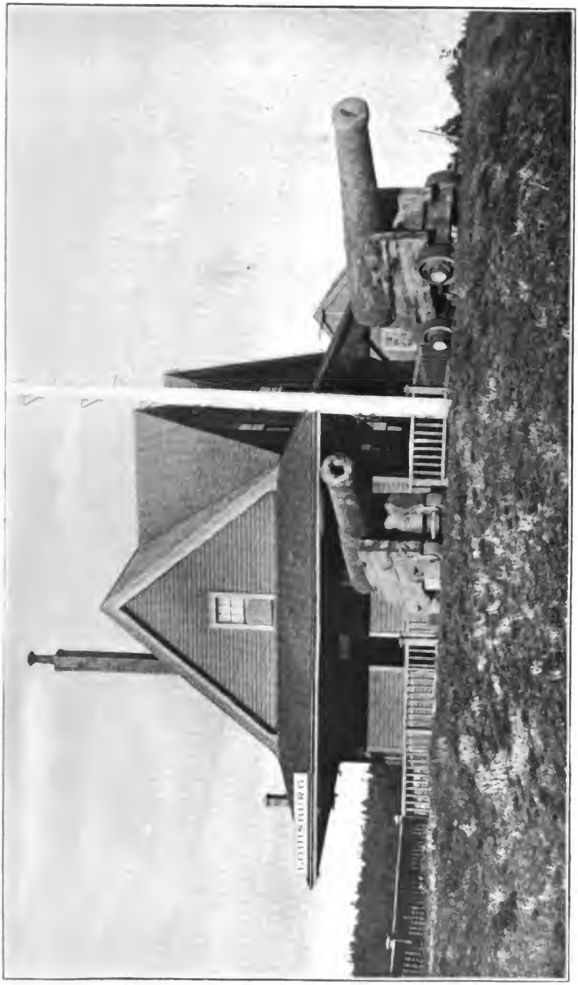
Québec a sa citadelle antique, que les Anglais, moins flegmatiques qu'on se plaît à l'écrire, ne visitent jamais sans un tressaillement de légitime orgueil; et ils viennent de chez eux, c'est-à-dire de toutes les parties de la terre, pour voir Québec et tressaillir.

Louisbourg a pour lui ses ruines incomparables et sa rade. Au fond de son histoire, en pleine lumière, plane l'aigle américain.

Si les Anglais ont rasé la grande forteresse, en 1758, ne sont-ce pas les puritains de la Nouvelle-Angleterre qui, les premiers, s'en sont emparés, en 1745 ? La prise de cette ville réputée inexpugnable, Troie succombant sous l'effort des Hellènes coalisés, fournit encore assez de gloire à deux empires pour les enivrer. Pour les Américains, c'est un peu du délire.

Laissez terminer le chemin de fer *Cape-Breton ;* édifiez, ensuite, dans l'enceinte des fortifications, un de ces somptueux hôtels mammouths dont les Américains ont inventé le prototype; annoncez-le dans les gazettes, comme la première place d'eau, la plus grande station balnéaire, le plus colossal *summer resort* du monde entier; ajoutez-y un musée inouï, où s'étaleront, aux yeux des touristes ébahis, toutes les antiquités, antiques et modernes, de la forteresse française, et le succès sera prodigieux.

Tout Américain assez ferré sur l'histoire pour remonter à l'an 1745 de Notre-Seigneur, voudra voir le théâtre des hauts faits d'armes de Pepperrell, à ses yeux le plus grand génie militaire des temps anciens, modernes et à venir; et les jeunes filles et les matrones de Boston, toutes plus ou moins bachelières, ès arts ou ès sciences, quand elles ne sont pas doctoresses en quelque chose, se feront une religion de connaître *de visu et auditu* cette tant glorieuse page de leur histoire nationale qui fut la prise de Louisbourg par leurs ancêtres.



GARE DU CHEMIN DE FER, NOUVEAU-LOUISBOURG.

Or voici le temps où jamais de sauver de l'irrémédiable destruction ce qui reste encore du colosse dont la chute décida, entre l'Angleterre et la France, de l'empire du Canada.

Sur la pointe de Rochefort, au rebord des fossés, le long des glacis, dorment côte-à-côte les valeureux soldats de France, les intrépides fantassins de marine d'Angleterre, les héroïques miliciens du Massachusetts, du Maine, du New-Hampshire et du Connecticut. La mort les a réunis, le temps les a confondus dans une même poussière indistincte; et personne ne vient plus troubler leur sommeil de paix, excepté les chacals et les démolisseurs.

Il y a plus d'un siècle que l'océan, qui vit s'écrouler la forte citadelle française, comme tombe un lion de la jongle sous les javelots des chasseurs, vient seul pleurer et parfois rugir à ses pieds. Les hommes n'y viennent plus, ou, s'ils y viennent, c'est pour faire œuvre de destruction stupide. Le vent gémit toujours sa mélopée plaintive parmi les casemates et les ossements blanchis; mais jamais prêtre en surplis blanc n'y vient chanter un *De profondis.*

Pas de pierre tombale, pas de mausolée, pas de croix.

C'est l'oubli plus glacial que les banquises qui effleurent le Cap Noir, le printemps; plus froid que les grands vents du nord, l'hiver.

Ceux qui versèrent leur sang pour donner un empire à l'Angleterre, sont aujourd'hui oubliés de l'Angleterre et des Anglais. Qui se souvient des morts ? Et pourtant dans le champ des morts, tout est sacré, jusqu'à la poussière, jusqu'aux pierres sous lesquelles reposent les héros et les martyrs. David nous le dit: *Placuerunt servis tuis lapides ejus, et terræ ejus miserabuntur.*

Tout invite à la piété envers ceux qui sont tombés là, tant pour la défense que pour la conquête du Canada. Les vieilles causes d'acrimonie peuvent toujours exister, au besoin, puisque les différences de religion et d'origine, qui constituèrent ces causes chez une génération intolérante, n'ont pas cessé d'être; mais la haine résultant de ces causes n'existe plus entre Français, Anglais et Puritains.

Montcalm repose avec Wolfe dans un même mausolée, et, avec eux, sont ensevelis beaucoup de préjugés, qui étaient les dogmes de l'intolérance, au siècle avant-dernier.

Un réveil salutaire se fait dans tout le pays en faveur de la conservation des vieux sites historiques.

Le gouvernement canadien lui-même, faisant mentir l'adage qui prétend que les corporations n'ont pas d'âme, vient d'acheter pour en faire une réserve publique, au prix de quatre-vingt mille dollars, les plaines d'Abraham, où il n'est pas du tout certain que la bataille des plaines d'Abraham se soit livrée.

Louisbourg offre à la sollicitude du gouvernement canadien non pas un champ de bataille douteux, mais des tombes, mais un cimetière, mais ce qui fut une ville entourée de fortifications vraies et réelles. Le tout est à la veille de passer en des mains étrangères. C'est comme si un syndicat d'industriels voulait faire l'acquisition de la citadelle de Frontenac et de Montcalm pour y dresser une foire exotique. Louisbourg, en tant que théâtre de guerre, est l'égal de Québec.

Les huit ou neuf occupants de Louisbourg avaient consenti de céder à la compagnie du chemin de fer, le *Cap-Breton,* moyennant une compensation raisonnable, ce qu'ils ont acquis de terrain, par droit d'occupation et de prescription, dans l'enceinte de la citadelle. Ils le céderaient, sans doute, aussi volontiers au gouvernement qui voudrait négocier avec eux. D'un autre côté, nous n'aurions qu'à demander au gouvernement impérial à se dessaisir du vieux site, pour qu'il le fit aussitôt.

Et ce qui fut Louisbourg, " et le champ où fut Troie ", redeviendrait propriété nationale.

Je livre ces considérations à la *Société Royale du Canada,* qui m'a fait l'honneur de me désigner pour lui présenter un rapport sur Louisbourg.

Quand verrons-nous notre parlement fédéral voter une loi semblable à celle qui fut passée en France, le 30 mars 1887, réglementant " la conservation des immeubles qui, au point de vue de l'histoire ou de l'art, offrent un intérêt national ? "

V.—*L'Abbé Cuoq—Notice biographique.*

Par A. F.

(Lue le 27 mai 1902.)

Le 25 juillet dernier avaient lieu au Lac des Deux-Montagnes les funérailles de M. Jean-André Cuoq, P.S.S., décédé après une courte maladie, à l'âge de soixante-et-dix-huit ans. Les paroissiens, en grande partie iroquois et algonquins, s'étaient fait un devoir d'accompagner à sa dernière demeure l'apôtre qui leur avait donné, pendant près d'un demi-siècle, le meilleur de ses forces et de son cœur. A la première nouvelle de la maladie du vénérable vieillard, M. le Supérieur était venu le visiter et Mgr Bruchési s'était arraché à ses occupations pour accourir lui porter sa bénédiction. Moins de huit jours après, Sa Grandeur reprenait le chemin d'Oka, accompagné de son grand vicaire, M. Racicot, mais cette fois pour offrir un suprême témoignage d'estime et d'affection à l'existence si humble, si laborieuse et si féconde qui venait de s'éteindre.

Le nom de M. Cuoq est peu connu du public ordinaire, mais il vivra longtemps dans deux portions distinctes, presque opposées de la société, dans les tribus indiennes et dans le monde savant. Sous l'humble toit où s'assemble la famille iroquoise ou algonquine, longtemps on le dira avec respect et amour, longtemps on évoquera le souvenir du père, de l'ami, qui passait en faisant le bien, en montrant le chemin du ciel, et son souvenir aux uns rappellera des promesses, aux autres de salutaires avis, de paternels reproches, pour tous sera une prédication muette, mais agissante, qui ne saurait rester sans fruits.

Dans les assemblées savantes des deux mondes d'Amérique et d'Europe, où l'on s'occupe d'indianalogie, le nom de M. Cuoq sera toujours salué avec respect, son opinion regardée comme une autorité.

Né à Puy en 1821, M. Cuoq entra à St-Sulpice en 1843; deux ans plus tard il arrivait au Canada. Il fut aussitôt envoyé au Lac des Deux-Montagnes pour y continuer l'œuvre d'évangélisation entreprise depuis plus de deux siècles en faveur des tribus indiennes. Apprendre les langues des peuplades à desservir s'imposait comme un devoir. M. Cuoq se mit à cette étude avec ardeur, disons tout, avec passion. En quelques années, il entra en possession du génie des langues algonquines et iroquoises et dépassa tous ceux qui l'avaient précédé dans la même voie.

Cette science allait servir la cause de la religion. C'était l'époque où Ernest Renan exécutait ses prodigieux tours de passe-passe qui ravirent, en France et à l'étranger, les applaudissements du public qui lit et qui s'amuse, ou pour employer le mot que M. Brunetière lui applique, dansait et faisait rire : " *Saltavit et placuit.*" Renan enivré par l'harmonie de ses phrases et plus encore par l'enjouement universel qu'il provoquait, ne doutant plus d'ailleurs que sa science ne s'étendit même à ce qu'il ne savait pas, avait avancé qu'entre les Peaux-Rouges et les races civilisées il y a toujours eu une différence irréductible. De là à nier la possibilité de tout rapprochement entre les idiomes américains et ceux de l'ancien monde, il n'y a qu'un pas; il fut franchi dans l'"Histoire générale et système comparé des langues sémitiques." Dans quel dessein? . . . on le devine aisément. Renan voulait arriver, par une déduction logique, à rejeter le fait important de l'unité de la race humaine et l'origine de la diversité des langues à la tour de Babel. Une fois de plus s'inscrire en faux contre l'Ecriture, et se payer la fantaisie de traiter ses récits de rêveries ou de mythes, quelle bonne aubaine! Quel triomphe!

M. Cuoq, bien que sa modestie l'inclinât au silence, pensa qu'il était de son devoir de répondre; d'ailleurs des encouragements qui, pour lui, étaient des ordres, lui venaient de Paris. M. de Hir le pressait de réfuter les erreurs sur les langues sauvages où était tombé l'auteur de l'*Histoire générale.* M. Cuoq fit alors paraître dans le *Journal de l'Instruction Publique du Canada,* une série d'articles bientôt réunis sous le titre: " Jugement erroné de M. Ernest Renan sur quelques langues sauvages de l'Amérique ". Cet ouvrage peu étendu mais substantiel, attira l'attention des savants de France et des Etats-Unis. Le rédacteur d'une revue linguistique de Paris, après un éloge sans réserve des articles parus, éloge d'autant plus sincère qu'il s'adressait à un auteur anonyme, suppliait le savant " de ne pas se borner à ce qu'il avait publié jusque-là, mais à donner à ses compatriotes et au monde savant tout entier une étude complète et approfondie des langues indiennes. . . C'est un service, ajoutait-il, que la science, la vérité et la religion attendent de son dévouement et de ses lumières."

M. Cuoq ne put résister à de si puissants motifs et peu après 1866, il publia les " Etudes philologiques sur quelques langues sauvages de l'Amérique ". Cet ouvrage fut suivi de plusieurs autres. Citons au hasard: Lexique iroquois; Grammaire algonquine; Grammaire iroquoise; Dictionnaire algonquin, etc. Encore ne parlons-nous pas de recueils de prières, d'instructions, de leçons catéchistiques, et même de cantiques, composés ou traduits pour l'usage des fidèles sauvages.

Ces ouvrages sont écrits dans un style sobre et précis, parfois même alerte et élégant, qui revèle sinon un littérateur, du moins un homme de goût.

Ils valurent à leur auteur de flatteuses distinctions dont il fut toujours le dernier à se flatter. La société Royale du Canada lui ouvrit son sein, bientôt après la société ethnologique de Washington lui faisait le même honneur; depuis il se vit nommer membre de plusieurs sociétés de Paris.

Ses confrères de St-Sulpice, et tous ceux qui ont connu M. Cuoq dans l'intimité, conserveront toujours le souvenir de sa conversation enjouée, spirituelle, pétillante, à feux roulants, de ses anecdotes souvent reprises mais toujours parées de nouveaux charmes, mais armées de nouveaux traits. Par delà l'homme d'esprit, ils reverront dans leur pensée le prêtre exemplaire qui aima la pauvreté jusqu'à ne pas conserver un seul de ses chers livres, la prière jusqu'à devancer le lever du jour pour s'y livrer, l'étude jusqu'à lui consacrer douze heures par jour, jusqu'à lire, durant les derniers mois de sa vie, quatorze volumes de la vie des saints, des Petits Bollandistes.

Mgr Bruchési, dans une brève allocution, a tenu à rendre hommage à une vie si cachée et si bien remplie, puis il a cédé la parole à M. Mainville, ancien curé des Iroquois de St-Régis, qui, dans un discours en langue indienne, a tiré, pour le plus grand bien de son auditoire, les terribles et salutaires enseignements de la mort. Le service a été chanté par M. Tallet, 1855, qui fut pendant plusieurs années le compagnon d'armes dans les missions sauvages.

ROYAL SOCIETY OF CANADA

TRANSACTIONS

SECTION II.

ENGLISH HISTORY, LITERATURE, ARCHÆOLOGY, ETC.

PAPERS FOR 1902

I.—*Modern Public Libraries and their Methods.*

By MR. LAWRENCE J. BURPEE.

Communicated by Sir John Bourinot, K.C.M.G.

(Read May 27, 1902.)

The history of libraries may be traced far back into classical times, but none of these were public libraries, in the modern sense of the term, any more than were the Monastic libraries of the Middle Ages. The first use of the term *bibliotheca publica* is found in the fifteenth century, and the collection of manuscripts bequeathed by Niccolo Niccoli to the city of Florence, with the distinct provision that they were to be devoted to the use of the citizens, may perhaps be regarded as the first public library. This early progenitor of the modern free library was afterwards merged into the Lauranziana, and the original manuscripts, or most of them, may still be seen in that library. It was, however, but an isolated example, far in advance of its times, and had no legitimate successor until long after the invention of printing.

After Gutenburg, Fust and Peter Schoeffer in Germany, Coster in Holland, and Caxton in England, had firmly established that greatest of all modern inventions, the Printing Press, libraries of all kinds became more common. They had previously been for the most part confined to the universities, the monasteries, and (in England) a few powerful guilds, such as the Corporation of London and the Kalendars of Bristol. They now spread among the less wealthy and the less learned classes. Legal and medical libraries were formed for the use of professional men; the old monastic libraries were offset, in Protestant centres, by libraries containing the works of Luther, Melanchthon, Erasmus, etc.; and in the castles of princes and great nobles were to be found collections of popular romances, chronicles, etc., such as came from the presses of Caxton, Wynkyn de Worde, and other early printers.

PUBLIC LIBRARIES OF GREAT BRITAIN.[1]

The earliest traces of free town libraries in England belong to the beginning of the seventeenth century. The town library at Norwich, founded in 1608, is a characteristic example of a class of library peculiar to this period. It is the oldest city free library with a continuous history to the present day. The Norwich library, and others of the same kind, were not provided by the community, as our modern free libraries are, but were the gift of some wealthy townsman who, like Niccolo Niccoli of Florence, industriously collected books during his lifetime, and when he died left them as a legacy to his fellow-citizens.

---

[1] For the following particulars regarding public libraries in the United Kingdom I am chiefly indebted to Mr. J. J. Ogle's admirable little work on *The Free Library*, London, 1897.

Five years after the establishment of the Norwich library, a city library was opened at Bristol. This library has since been absorbed by the new Bristol Free Library. A parochial free library was established in 1623 at Langley Marish, in Buckinghamshire, by Sir John Kederminster. The town of Leicester opened a library in 1632; and in 1653 the Chetham Library at Manchester was founded, through the generosity of Sir Humphrey Chetham. Numerous grammar school libraries also dated from the end of the sixteenth and beginning of the seventeenth centuries.

In 1753 the greatest of all English libraries was established—the British Museum. The subsequent history of free public libraries in Great Britain is closely identified with this great national institution. The influence of the Museum and its librarians has always been a powerful factor for good in the moulding of public sentiment towards free public libraries in every part of the United Kingdom, and each new development in the organization and management of libraries has been carefully examined and tested at the Museum.

The British Museum has become the repository from time to time of many earlier collections of books and manuscripts. The first of these was the library of 50,000 volumes of printed books and manuscripts, with collections of coins, medals, etc., acquired by the nation from the estate of Sir Hans Sloane of Chelsea, and which formed the nucleus of the British Museum. At the same time the Harleian MSS. were purchased, and these, with the Cottonian MSS., already the property of the nation, were added to the new national library. Shortly afterwards the King—George II.—transferred to the Museum the Royal Library of the Kings of England, containing some splendid examples of early printing, including a series of vellum copies by the famous French printer Verard, specimens of Caxton, De Worde and other early English printers, besides many valuable MSS. Since then the Museum has been the recipient of a dozen or more valuable collections of books, pamphlets, and manuscripts, including the Thomason Collection, 30,000 distinct publications, presented by George III.; the Cracherode Bequest of 4,500 volumes, made in 1799; the splendid library of 84,000 books and MSS. presented by George IV.; the Grenville Collection, received in 1846, etc. One of the most curious bequests was a set of the Chinese "Cyclopædia," a single work in 5,000 volumes.

The growth of this great library is well illustrated by the number of readers who made use of it at different periods of its history. In 1810 the number of visitors to the old Reading Room was about 1,950 for the whole year; in 1832 the visits had increased to 46,800; and in 1894 the number of readers was over 200,000.

In 1845 an Act "for encouraging the establishment of museums in large towns" was passed. Although the Act made no provision for books, the town of Warrington in 1848 established a library of reference, free to the public on certain days and within certain hours, and a lending library, which could be used only by subscribing members.

Salford followed the next year. Warrington was therefore the first English city to establish a municipally-controlled and rate-supported free library, though it was a long way from the free library of the present day.

The first Public Libraries Act of the United Kingdom was passed in 1850. This Act was the product of a Select Committee of the House of Commons. The Committee examined a large number of witnesses, one of the most important being Mr. Edward Edwards,[1] whose name is associated with that of William Ewart, as founders of the English free library system. Mr. Edwards, in his evidence before the Committee, established the fact that in that year (1850), although there were some 250 public libraries on the Continent "easily accessible to the poor as well as to the rich, to the foreigner as well as to the native"; and over 100 in the United States, most of them entirely open to the public; there was "only one free library in Great Britain equally accessible with these numerous libraries abroad, the library founded by Humphrey Chetham in the borough of Manchester."

The Public Libraries Act of 1850 allowed the establishment of libraries and museums of art and science, together or separately, but applied only to municipal boroughs in England. "The mayor, on the request of a town council, was to ascertain whether the Act should be adopted by a poll of the burgesses, but a two-thirds majority was required for adoption." No provision was made, however, for buying books or specimens. These were left to the random generosity of some townsman or other.

Several amending acts followed in the next few years, extending the operation of the Act of 1850 to Ireland and Scotland; providing for a penny rate in the pound; for the purchase of books and specimens; the addition of news-rooms, etc. These latter provisions were embodied in the Act of 1855, which repealed the 1850 Act, and remained the principal Act for England and Wales until 1892.

The effect of these Library Acts was felt immediately throughout England. Ewart's first Act (1850) had been passed only about two months when the city of Norwich adopted its provisions by a vote of 150 to 7. Winchester followed the next year; and in 1860 Birmingham, Bolton, Manchester and Oxford came into line. In 1853 Blackburn and Sheffield in the north, and Cambridge and Ipswich in the east, accepted the new Act. Liverpool had already come in under a local act. Airdrie in Scotland, and Cork in Ireland were the first towns to adopt the Library Act outside of England and Wales. Others followed during the next few years.

---

[1] See "Edward Edwards, the chief pioneer of Municipal Public Libraries," by Thomas Greenwood. London, 1902, pp. 246.

In 1869 Mr. Baines, M.P., moved for a return of public libraries, which was furnished to Parliament in 1870. This Return shows, up to the end of 1868, forty-six adoptions of the Act, or local acts equivalent thereto; twenty-nine places had established fifty-two libraries, with nearly half a million volumes and a yearly circulation of 3,400,000 volumes. The amount raised by rate for public libraries and museums was at least £25,400 per annum.

In 1877 a Conference of libraries was held in the lecture theatre of the London Institution—the first gathering of the kind in Europe. Two such conferences had already been held in the United States, the first at New York in 1853, and the second at Philadelphia in 1876, during the Centennial Exhibition. The London Conference was largely an outcome of the Philadelphia meeting, which had been so successful as to encourage English librarians to attempt something of the same kind. There were 218 librarians present, representing 139 libraries, of which the United States contributed 17, France 4, Italy 1, Belgium 1, Denmark 2, Australia 1, and Great Britain and Ireland 113. Out of this Conference grew, among other things, the Library Association of the United Kingdom, the formation of which marked the commencement of a new period in the history of the free library in Great Britain. One of the most important matters discussed at the Conference was the question of printing the catalogue of the British Museum, a colossal undertaking, which was commenced in 1881 and completed by the end of the century. I shall have a few words to say about this catalogue later on.

In 1879 the Birmingham Free Library was destroyed by fire, and a number of irreplaceable literary treasures were lost, including the greater part of the splendid collection of Shakespeariana. Only 1,000 volumes from the reference library of 50,000 were saved from the flames. A new and larger library, however, sprang up in its place, and now ranks among the foremost libraries of England. The new central library was opened on the 1st June, 1882, when speeches were delivered by John Bright, Joseph Chamberlain, and others. It is perhaps worth mentioning that Mr. Bright had also taken a leading part in the inauguration of the Manchester free libraries, some thirty years previously, when, besides his own, speeches were delivered by

Dickens, Thackeray, Bulwer Lytton, Monckton Milnes, and other great men of the day.

Of the libraries of the United Kingdom, the British Museum stands head and shoulders above all others. It is the national library of Great Britain and Ireland—of the British Empire in fact; and in a still broader sense it may be said to be the library *par excellence* of the whole English-speaking world. It is governed by a board of Trustees or Directors, divided into three groups: official, representing State departments and great national institutions; elected, consisting of men of the highest standing in literature, science and art; and family trustees, representing the families which have contributed very important collections to the Museum such as the Sloans, Cottonian and Townley.

For the first sixty years of the Museum's existence, the funds available for purchases and management, outside of the initial funds and gifts, did not average £500 per annum. Later, through the untiring efforts of Sir Anthony Panizzi, the famous head of the Museum, the Government were induced to increase the annual grants, for a time, to £10,000.

The British Museum at first consisted of three departments,— printed books, manuscripts, and natural history; now there are twelve,— four covering natural history, four relating to antiquities, and four literary, *i.e.*, printed books, manuscripts, prints and drawings, and Oriental printed books and manuscripts.

The library now consists of about 2,000,000 volumes, the largest collection in the world, with the possible exception of the Bibliothèque Nationale at Paris. The additions of printed books of all descriptions average 46,000 annually. Some forty years ago, Mr. Watts, one of the most learned of the Museum's librarians, made the following striking statement, illustrating the unequalled scope of the Museum library in every department of human knowledge, and in all languages: — "The Museum is now supposed to possess the best Russian library in existence out of Russia, the best Hungarian out of Hungary, the best Dutch out of Holland; in short, the best library in every European language out of the territory in which that language is vernacular. The books are in every case the standard books of the language — the laws, the histories, the biographies, the works on topography and local history, the poets and novelists in most esteem; in short, all that moulds or paints the life and manners of a nation, and which now a student of any European language need travel no further than to the reading-room of the Museum to see and make use of."

The Bodleian Library, at Oxford, ranks next in importance to the British Museum, among English libraries, but as it is a university rather than a public library, it hardly comes within the scope of this paper. It is chiefly famous for the value of its unique collections of manuscripts, and in this department it perhaps ranks even above the British Museum.

The original City Library of London, of which the present Guildhall Library is the legitimate successor, was founded by the executors of the renowned Richard (or Dick) Whityngton, Lord Mayor of London, and of William Bury, early in the fifteenth century. The old City Library fell upon days of indifference and nothing was heard of it for several centuries, until in 1824 it was restored by a resolution in the Court of Common Council. In June, 1828, the library was opened with 1700 volumes. In 1840 these had grown to nearly 10,000; and in 1893 to 68,369 books, besides 38,075 pamphlets. Of late years there has been a movement on foot for the unification of the various free libraries in London, the Guildhall Library to become a central reference library, with a limited number of branch reference libraries systematically distributed throughout the city with due regard to public needs, thus leaving free many of the smaller libraries to development as lending libraries.

Of the free libraries in London, Battersea was established in 1887, and now contains 40,000 volumes. Chelsea opened the same year, and has now about 30,000 volumes. Clerkenwell was established in 1888; Hampstead in 1893; and Lambeth in 1896. Other representative London free libraries are those of Newington, Poplar, Hanover Square, Shoreditch, Wandsworth and St. Martin's.

The most important of the English free libraries outside of London are those of Manchester, Liverpool, Birmingham, Leeds, and Hull. The most important free library in Scotland is that of Edinburgh. The Mitchell Library at Glasgow is an endowed, not a free public library. It was founded by the late Stephen Mitchell, and opened in 1877 with over 14,000 volumes, which have since grown to something over 123,000. The leading Irish free libraries are those at Belfast and Dublin.

The Manchester free library system consists of a central reference library with eleven branches and four reading rooms. There are some 270,000 volumes on the shelves, and the annual circulation averages 2,000,000 volumes.

To Liverpool belongs the honour of having established the earliest branch library; of first introducing into a free library books for the blind, (1857); and book-music (1859).

The Birmingham library dates from 1860, when the Act was adopted by an overwhelming majority, in spite of much opposition. The reference library was opened in 1865. Some instructive remarks have been made by Dr. Langford as to the principles which guided the Birmingham Library Committee in their choice of books — principles which might very well be recommended to the attention of other library committees and librarians: — "The Committee were guided by three principles: first, that the library should as far as practicable represent every phase of human thought and every variety of opinion; second, that books of permanent value and of standard interest should form the principal portion of the library, and that modern and popular books should be added from time to time as they are published; third, that it should contain those rare and costly works which are generally out of the reach of individual students and collectors, and which are not usually found in provincial or private libraries." The third principle could, of course, only be carried out to a limited extent by any but the largest and wealthiest city libraries.

There are now nine branches at Birmingham, besides the central libraries. The number of books at the end of 1895 was nearly 210,000; and the circulation in that year exceeded 1,200,000.

The Leeds Library was established in 1870. Here the system of branches has been carried farther than anywhere else in England. There are altogether some fifty-eight branches, thirty-seven school branches and twenty-one other branches; with about 192,000 volumes.

The public library at Kingston-upon-Hull was established in 1892, after a long fight against bitter and determined opposition. There are two central libraries and two branches; the number of volumes being, in 1896, 52,588, of which 12,830 were in the two reference libraries.

The Edinburgh Public Library owes its beautiful building to the generosity of that friend of libraries, Andrew Carnegie, who gave £50,000 for the purpose. There are now over 100,000 volumes on the shelves.

The two free libraries in Dublin are comparatively unimportant as compared with the library systems of English cities of the same size. They are, however, only a temporary expedient, and are to be developed into a library worthy of the capital of Ireland. The chief library in Dublin is the National Library of Ireland, an institution which bears somewhat the same relation to Ireland as the British Museum does to England. This library is housed in a building which admirably combines architectural beauty with the requirements of modern librarianship. It is situated close to Leinster House, the home of the Royal Dublin Society.

The Belfast Library dates from 1883. With its branches it now contains about 35,000 volumes.

Mr. J. J. Ogle, in his work on "The Free Library," estimates that in 1897 there were no fewer than six or seven hundred free libraries established in 300 towns, parishes, or districts, under the Public Libraries Acts of the United Kingdom. These libraries then contained 5,000,000 volumes, and had an annual issue of from twenty-five to thirty millions. This estimate does not, of course, include the British Museum, the Bodleian, or other libraries not strictly coming within the class of municipal free libraries. The outstanding loans on free public library property, in England and Wales only, amounted to not less than £800,000, despite the fact of the very considerable gifts of buildings in every part of the country. "But" adds Mr. Ogle "the end is not yet. The movement is yet young, and it is vigorous with the strength and activity of adolescence. The towns will yet show advances neither few nor small ; but the villages, the counties, have yet to reap the advantage the towns enjoy ; the metropolis has yet to do much to equal the provision of the larger provincial centres, whose libraries of twenty, thirty or forty years' formation are one of the glories of this mercantile age."

European Libraries.

One would need the compass of a large volume within which to describe the many famous libraries of Europe, and it is hopeless to attempt even a partial sketch of this wide field. All that can be done here is to mention a few of the more famous and representative libraries. As a matter of fact the public libraries of Europe, outside of England, whether supported by municipalities or by the state, hardly come directly within the scope of this paper, for, with a few notable exceptions, they are in no sense modern, in architecture, methods, or in their relations to the community. On their shelves are found manuscripts, *incunabula*, rare editions and other priceless literary treasures, and in this respect the libraries of America can never hope to compete with them ; but in a majority of cases the libraries of Europe are still mediæval in their methods. They have not adopted the democratic principles of English and American public libraries. They make no special effort to throw their stores of books open in the fullest possible sense to the public.

Of the French libraries, the most important is, of course, the Bibliothèque Nationale, whose history runs back to the days of King John and Charles V. Although this great library is generally counted to be the largest in the world, the question is not without doubt.

Its only rival is the British Museum, but the number of books in the Museum library are known definitely; while the contents of the French National Library have not been actually counted since 1791.

Besides the Bibliothèque Nationale, there are fifteen other libraries in Paris each containing above 30,000 volumes. In the rest of France there are some 350 free public libraries, containing approximately 4,000,000 volumes, and 50,000 MSS.

Germany has many libraries, seventy-two being counted in Berlin alone in 1875, with about 1,300,000 printed books. Munich contains several good libraries; and at Dresden there are about fifty. Stuttgart, Darmstadt, Gotha, are all strong library centres.

In Austria there were in 1873-74 about 550 libraries, only 45 of which were however of a public character. Of the 550, Vienna alone is credited with 101.

The public libraries of Switzerland are numerous, but very small. Some 2000 were recorded in 1868, but of these only 18 had as many as 30,000 volumes.

Italy boasts some of the most famous libraries of Europe, notably the Vatican Library at Rome, the Magliabecchiana and Laurentian libraries at Florence, and the Museo Borbonico at Naples. In 1865 a table of relative statistics was published by the Italian Government, which professed to show the remarkable fact that, with the exception of France, Italy possessed the largest total number of books of any country in Europe, the total contents of French libraries being 4,389,000, and of Italian libraries, 4,149,281.

In Belgium and Holland, great libraries are found at Brussels, Ghent, The Hague, Leyden, etc. Denmark, Norway and Sweden also boast of many notable libraries. At Madrid, in Spain, and Lisbon, in Portugal, the Biblioteca Nacional contains several hundred thousand books and valuable MSS. covering the literature of their respective countries. In Russia, the chief libraries are at St. Petersburg and Moscow.

LIBRARIES IN THE UNITED STATES.

The history of public libraries in the United States goes back to the early part of the nineteenth century. The Boston Public Library, in fact, claims to trace its existence back to the middle of the seventeenth century, but it was not until nearly two hundred years afterwards that a public library in the modern sense of the term, was established there.

In 1817 Dr. Jesse Torrey, Jr., published a pamphlet entitled "The intellectual torch," in which he made an earnest plea for " the universal dissemination of knowledge and virtue, by means of free public libraries." This pamphlet is said to be a second edition of an earlier one entitled "The intellectual flambeau," published at Washington in 1816.

The first public library law in America was that passed by the State of New York in 1835. One writer,[1] indeed, states that it was "the first known law of a state allowing the people to tax themselves to maintain genuine, public libraries. The law did not establish libraries for schools (as some have supposed) but for the people, in districts of the size of a school district." In fact, the author of the Act, John A. Dix, Secretary of State for New York, distinctly stated that "The object was not so much for the benefit of children attending school, as for those who have completed their common school education. Its main design was to throw into school districts, and place within the reach of all their inhabitants, a collection of good works on subjects calculated to enlarge their understandings and store their minds with useful knowledge."

This Act provided that :

1. The taxable inhabitants of each school district in the state shall have power, when lawfully assembled at any district meeting, to lay a tax on the district, not exceeding $20 for the first year, for the purchase of a district library, consisting of such books as they shall in their district meeting direct, and such further sum as they may deem necessary for the purchase of a bookcase. The intention to propose such tax shall be stated in the notice required to be given for such meeting.
2. The taxable inhabitants of each school district shall also have power, when so assembled in any subsequent year, to lay a tax not exceeding $10 in any one year, for the purpose of making additions to the district library.
3. The clerk of the district, or such other person as the taxable inhabitants may at their annual meeting designate and appoint by a majority of votes, shall be the librarian of the district, and shall have the care and custody of the library, under such regulations as the inhabitants may adopt for his government.
4. The taxes authorized by this act to be raised, shall be assessed and collected in the same manner as a tax for building a schoolhouse.

Three years after the passing of this act, $55,000 a year was set apart by the State of New York for books and apparatus for school districts, provided the districts would give as much as their pro rata share. The example of New York was soon followed by other States of the Union, both in the east and west, and eventually paved the way to a broader and better system of free public libraries supported by local rates. The school district library reached its highest development between 1838 and 1851. Early in the seventies it was found to have outlived its usefulness, and was gradually superseded by the present system.[1]

---

[1] Dr. Homes, "Legislation for public libraries," *Library Journal*, July-August, 1879.

The centre of the free public library system of the State of New York is the State University at Albany, founded in 1784 "to encourage and promote higher education". This unique university now includes 938 institutions and 510 affiliated institutions, making a total of 1448. Under the system in vogue, when a town or village wishes to establish a public library, the local trustees obtain a charter from the university, which entitles them to a state grant (not exceeding $200) equal to the amount raised for the library by local effort. The library then becomes an integral part of the State University. The state library at Albany is the heart of the whole system. Here an efficient Library School is maintained for the training of librarians and their assistants; from here an Inspector visits the various libraries throughout the State, and keeps them up to a proper standard of efficiency; from here travelling libraries are sent forth to various centres — there are now about 500 of these travelling libraries moving about the State. The various libraries are kept in touch with the central department, and every possible assistance is given to librarians and library trustees, by means of reports, circulars, bulletins, personal advice, assistance in planning library buildings, lists of best books, and public addresses and discussions.

The public library movement in Massachusetts may be said to be almost as old as the colony. One Captain Robert Keayne, an eccentric tailor, founded the first public library in Boston by a legacy of books and money. This early progenitor of the present magnificent library was housed, in 1658, in a room in the markethouse. It was not, however, until 1848 that Boston secured legal authority to establish and maintain a public library. Gifts of books and money at once began to come in for the purpose, but the library was not formally established until 1852. The present splendid collection of books had for its nucleus a gift of about fifty volumes from the city of Paris in 1843, "through the efforts of an enthusiastic Frenchman named Vattemare, who proposed to build up libraries through a system of international exchanges". The Boston Public Library is now the largest and most thoroughly organized free public library in the world.

Boston was the pioneer in library extension in the state, but a general law was soon passed, which was rapidly taken advantage of throughout Massachusetts. In 1890, when the Free Public Libraries Commission was established, there were 248 out of the 341 towns in the commonwealth, that enjoyed such privileges. In 1899 there were only seven towns that were still without a free library, and these comprised less than one-half of one per cent of the population. I have not the figures of the past year before me, but think it very probable that even some of the benighted seven have ere this joined the enlightened majority by establishing public libraries in their midst.

---

[1] The district library system was adopted by Massachusetts and Michigan in 1837; Connecticut in 1839; Rhode Island and Iowa in 1840; Indiana, 1841; Maine, 1844; Ohio, 1847; Wisconsin, 1847; Missouri, 1853; California and Oregon, 1854; Illinois, 1855; Kansas and Virginia, 1870; New Jersey, 1871; Kentucky and Minnesota, 1873; and Colorado, 1876.

In the free libraries of Massachusetts there were, in 1899, some 3,750,000 volumes, with an annual circulation of 7,666,666, or over three volumes to every inhabitant. The amount given for libraries and library buildings in Massachusetts in the shape of gifts and bequests, reaches in money alone the sum of over $8,000,000.

In an exhaustive and very valuable monograph upon "Public Libraries and Popular Education," by Herbert B. Adams, Ph.D., LL.D., Professor of American and institutional history in Johns Hopkins University, the following list is given, admirably illustrating the evolution of the American library. Dr. Adams calls it a "select list of original library types":—

1. The private libraries of early colonists.

2. The institutional or scholastic libraries of Harvard, Yale, William & Mary colleges, etc.

3. The church or parish libraries instituted in North Carolina, Maryland, and the South by Dr. Bray, founder and Secretary of the Society for the Propagation of the Gospel.

4. The co-operative or joint-stock library, *e.g.*, the Philadelphia Library Company, founded by Benjamin Franklin in 1731, which antedates by 25 years the first subscription library in England (Liverpool, 1756).[1]

5. The first theological library in America was that of St. Mary's theological seminary of St. Sulpice, Baltimore, 1791.

6. The first law library was that of the Bar Association of Philadelphia, 1802.

7. The first medical library was at Pennsylvania Hospital, Philadelphia, 1763.

8 The first scientific libraries were those of the American Philosophical Society, Philadelphia, 1743; and of the American Academy of Arts & Sciences, Boston, 1780.

9. The first State Historical Society library was that of Massachusetts, founded at Boston, 1791.

10. The first foreign nationality to establish a library was the German Society of Philadelphia, 1764.

11. The first town library was in Salisbury, Ct., 1803, or at Peterborough, N.H., 1833.

---

[1] This is incorrect. A subscription library was established in Edinburgh as early as 1725, and in London in 1740. The Liverpool (Lyceum) Library was founded in 1758, not 1756.

12. The Congressional Library was founded at Washington in 1800.

13. The first formal state library was that of New Jersey, established in 1796.

14. Young men's mercantile libraries were founded in Boston and New York in 1820.

15. School district libraries were authorized by law in 1835.

16. Endowed libraries were instituted at many different times and places.

17. Free public libraries, as progressive institutions, belong to the latter half of the nineteenth century.

18. The federal or confederate type of public libraries, like those now grouped together in New York as the New York Public Library, by consolidation of the Astor and Lenox libraries with the Tilden.

19. The travelling library is the latest and one of the most popular types of public libraries. It best represents library extension.

The American library which bears the closest resemblance to the British Museum, as a national institution, is the Library of Congress. This library has had a chequered career. Established in 1800, it was burned, together with the Capitol, during the war of 1812, by the British army. In 1851 another fire destroyed all but 20,000 of the books. Since then the library has grown rapidly, and now numbers close upon a million books and pamphlets. As in the case of the British Museum and the Bodleian Library at Oxford, the Library of Congress is entitled by law to receive two copies of every publication which claims copyright. The magnificent new building in which the library is housed, is furnished with every modern convenience for the safety and convenient use of the books.

The Boston Public Library at present contains something over 750,000 volumes. It has been the recipient of many valuable gifts in books and money from its broad-minded citizens, the most notable being Joshua Bates, after whom the stately Bates Hall is named, Theodore Parker and George Ticknor the publisher. Josiah Quincy, mayor of Boston, gave the following graphic description of the library and its work for the public, in the *Saturday Evening Post* (Philadelphia), June 3rd, 1899: —

> "The work of our public library is of such a comprehensive character that it partakes very largely of the nature of a popular university, and comes very near to constituting an example of municipal socialism carried into practice. Our library plant—building, books and equipment—represents an investment of at least $5,000,000. Three hundred and fifty persons are employed in connection with its service, and it costs the city over a quarter of a million dollars a year to maintain it. Besides the central library, we have 10 branch libraries, containing independent collections of books, and 18 delivery stations. There are outstanding 65,000 active cards for a population of 530,000 people. Over 700 readers are generally to be found in the central building alone, and about 1,250,000 books are annually issued to card holders for use at home. The people of Boston contribute nearly half a

dollar annually per capita for the support of this great institution, and I doubt whether a community can be found anywhere in the world which taxes itself as heavily to provide library facilities, or which makes a larger use of them."

In addition to the 10 branches and 18 delivery stations mentioned by Mr. Quincy, there are also 33 other places—public schools, engine houses, etc.,—where books are regularly received on deposit. This makes a total of 61 outlying agencies of the library.[1]

The New York Public Library is a new institution, in which are merged the Astor, Lenox and Tilden Libraries. It is possible that before long the New York Circulating Library may also be included in the general scheme, thus constituting one of the largest libraries in America. Dr. John S. Billings, a man of broad views and ripe experience, has charge of the amalgamated libraries. A splendid library building is now in course of erection in Bryant Park, and Mr. Carnegie has offered an enormous sum for the establishment of branch libraries in every quarter of Greater New York. The popularity of the New York libraries may be gauged from the fact that the daily combined average number of readers at the Astor and Lenox Libraries was found in 1899 to be 488 ; while the average attendance at the British Museum, with over three times the number of books, was only 516. The New York Public Library, as at present constituted, contains in the neighbourhood of 700,000 volumes.

The New York Free Circulating Library was first incorporated in 1880. There are at present 10 branches, with over 100,000 books. No central library exists, but books are sent from one branch to another as required, and there is a general catalogue of all the branches. This library system is almost entirely supported by private subscriptions, but it is free to the public, nothing but a guarantee being required for an intending card-holder.

One of the most remarkable examples of a modern public library system is that of Philadelphia. Here the modern idea of supplementing the central library by outlying branches has been carried a long step further by practically abolishing the central repository altogether, and relying upon the branches alone—going to the people in their own neighbourhoods, instead of making them travel to a distant central library. Travelling libraries are another popular feature of the Philadelphia system.

At Philadelphia is also to be found the oldest proprietory or subscription library in the United States—the Library Company of Philadelphia. This project was originally set on foot by Benjamin

---

[1] It appears by a recent report that these 61 agencies have now (1902) been increased to 87.

Franklin in 1731. The collection combines the character of a public and a subscription library, being open to the public for reference purposes, while the books circulate only among the subscribing members. It numbers at present about 130,000 books.

Other American proprietory libraries are the Mercantile Library Company of Philadelphia, the Boston Athenæum, the Mercantile Library of New York, the Apprentices' Library of New York, etc. None of these, however, are, strictly speaking, free public libraries.

The Buffalo Public Library was originally incorporated in 1837, but it was a subscription library until 1897, when it was taken over by the city. It now contains in the neighbourhood of 100,000 books, with about 10,000 pamphlets. The advantages of a free public, over a subscription, library is forcibly illustrated by the fact that while the year previous to the transfer of the Buffalo library to the city, the entire circulation of books was only 142,659, in four months from the public opening in September, 1897, it had increased to 262,232, and in 1898 to 768,028 volumes. An interesting feature of the Buffalo library is its close connection with the public school system of the city. Mr. Elmendorf, the superintendent of the library, in his annual report for 1897, says: "The library is in the closest co-operation with the high schools. An assistant visits each school before the opening hour on every school day, receives books to be returned and lists of books wanted, and makes delivery at the close of school; plans are being made in connection with the Superintendent of Public Education to include all schools of the city in a travelling library system." In 1898 Buffalo had 40 travelling libraries reaching schools, literary clubs, chapter houses and social settlements.

Another American library that has made special efforts to do educational work, both through its reference and circulating departments, is the Reynolds Library at Rochester. Mr. George F. Bowerman, formerly reference librarian at the Reynolds Library, thus describes the method adopted to make that library of value to students,— to make it in fact a centre of post-school education:—

"Early in every scholastic year, that is, in August or September, the managers of University Extension courses, the secretaries of literary societies, reading clubs, etc., are invited to send in their courses of study for the season, together with the list of books which they wish for their use. Any books on these lists which the library does not have are ordered, and the books laid down in each course are brought together and reserved in the reference room for the club members during the season. As soon as one course was finished the books would go back into the circulating department and their places be occupied by those of another course. In supplying these clubs with the books necessary for carrying on their studies we are able to make a comparatively small library of great educational use."

The Osterhout Free Library, at Wilkesbarre, Penn., is an interesting architectural example of a church building transferred into a library. Special attention is directed here to the children's department. The librarian, Miss H. P. James, says of this department of her library: — "In selecting our books, I was careful to leave out all sensational reading and give the preference to stories with some historical basis. We have a good store of Henty's books, and have appended a note to each entry, showing the time of the incidents covered. Of course we have also all the books of Coffin, Drake, Knox, Butterworth, French and Scudder. In the reference room I have a goodly constituency of small readers with ragged clothes, not very clean faces, but their hands are clean. The lavatory close by the door is visited before they come to me for books, as they have learned that it is indispensable. I feared that the beauty of the room might be a little forbidding, but they don't mind it in the least. A better behaved set than the little ragamuffins are, it would be hard to find." This feature of modern librarianship—the reaching out after the children, bringing them into the library, placing them at their ease in a special room where tables and chairs are made to fit their small bodies, and providing them with the books they desire — is one of the most notable and praiseworthy developments in American libraries. Nearly all the best city libraries in the United States have special provision for children, a children's department, where they are welcomed sympathetically, and taught at the very threshold of life to cultivate the love of reading and the love of good books.

One of the largest and most progressive of the western libraries is that of Cincinnati, which was established on its present footing in 1867. It contains about 150,000 books, besides pamphlets. The main library is a very handsome and well-equipped building, and there are two branches besides.

The Newberry Library, in Chicago, is chiefly notable on account of its unique plan for classifying and arranging books, devised and carried out by Dr. Poole, the original compiler of that famous and indispensable work, "Poole's Index." In the Newberry Library the several branches of human knowledge are shelved in different rooms, arranged on a symmetrical plan, with provision for the addition of other rooms as the growth of the library should call for further subdivision. The building is simple in form, but substantially constructed, and provided with every modern library convenience. Carrying out Mr. Poole's plan, the books are not shelved in stacks, but in a single tier of cases covering the floor of each room, with room for readers' tables.

Space will not permit me to describe the many other prominent libraries of the United States, such as the Chicago Public Library, San Francisco Public, the popular and exceedingly energetic library at Denver, the Pratt Institute, Brooklyn, the Peabody Institute at Baltimore, etc.

From a report issued by the United States Bureau of Education, it appears that in 1900 there were 5,383 public, society and school libraries in the United States having one thousand volumes or over. These libraries contained altogether 44,591,851 volumes and 7,503,588 pamphlets. The number of manuscripts is not stated, but outside of a few of the largest libraries they would be insignificant. Of the individual states, New York ranks first, with 718 libraries, containing 7,490,509 volumes and 1,803,828 pamphlets. Massachusetts comes second, with 571 libraries, 6,633,285 volumes, and 1,150,277 pamphlets. Pennsylvania is third, with 401 libraries, 3,974,577 volumes, and 538,819 pamphlets. Illinois follows next, with 309 libraries; then Ohio, with 266; and California, with 212. Eleven other States have between 100 and 200 libraries each. The remainder run from 96 in Vermont down to Arizona and the Indian Territory, which possess 5 and 3 libraries respectively.

I will venture to sum up this hasty sketch of United States libraries by quoting from an address delivered by Mr. Melvil Dewey at Convocation of the University of the State of New York, 1888. Mr. Dewey said, speaking of the progress of libraries and librarianship in the United States:—

> We date active progress from 1876, when, after a four days' successful conference in Philadelphia, the American Library Association was organized. It holds annual meetings, marked among conventions by their practical work and enthusiasm. The same year we started an official monthly organ, the *Library Journal* (now, 1902, in its 27th year). Shortly after followed that most important practical factor in library work, the Library Bureau of Boston, which undertakes to do for libraries such work as is not practicable for the association or magazine. It equips large or small libraries with everything needed (except books and periodicals) of the best patterns devised by or known to the officers and committees of the association, of which it is the tangible representative for manufacturing and distributing improved appliances and supplies. Ten years after the *Journal*, which, because of its limited circulation, barely pays expenses at $5 a year, came its co-labourer, *Library Notes*, a quarterly magazine of librarianship, specially devoted to the modern methods and spirit, and circulated widely because of its low price. Last of the great steps came the school for training librarians and cataloguers, which two years ago (1887) was opened at Columbia College, through the same influence which had before started the Association, *Journal*, Bureau and *Notes*. You who appreciate what Normal Schools are doing to improve

our teaching will remember that librarians need a training school more than teachers, who have had the experience of their own school life as a pattern; for librarians till two years ago never had opportunity for training, and came to their work like teachers who had been self-taught, and not only had no normal school advantages, but had never been in a school or classroom even as pupils. As evidence of the growth of the idea, we may note that this library school, which began two years ago with a twelve weeks' course and provision for 5 to 10 pupils, has in two years developed to a course of full two years with four times as many students at work, and in spite of rapidly increased requirements for admission is to-day embarrassed by five times as many candidates as it can receive. This means a recognition of the high calling of the modern librarian who works in the modern spirit with the high ideals which the school holds before its pupils.

It should be mentioned that this plan for a library school originated with Mr. Dewey himself. Some eight years before the first library school was established in the United States, the British Library Association passed a resolution in favour of training library assistants in the general principles of their profession, but nothing practical came of the suggestion at the time. Since then a library summer school has been established, under the auspices of the Library Association of the United Kingdom, but it is inferior to the American schools in every way. We must look on this side of the Atlantic for the most phenomenal progress in this branch of librarianship. Since the first Library School was established at Columbia College, in 1887, similar institutions have sprung up all over the United States. In 1889 Mr. Dewey transferred the Columbia College School to the New York State Library at Albany. Here he organized the school upon a sound and permanent basis, with a strong faculty, and a thorough course of training, leading up to the degree of B.L.S. (bachelor of library science), given only to those students who pass the entire course with honours. A summer course is also offered by this school, for the benefit of persons who already hold a library position and wish to gain a broader conception of library work as a whole.

Other library schools are those at the Pratt Institute, Brooklyn; at the Drexel Institute, Philadelphia; and at the University of Illinois, where library economy has been given a regular place among the college courses. At Madison, under the auspices of the State University, is another school, the Wisconsin Summer School of Library Science. Professor Wm. I. Fletcher, whose valuable continuation of Poole's *Index* most of us know the value of, established a library school at Amherst College in 1891, which he personally conducts for five weeks in midsummer. Lastly may be mentioned the Washington School of Library Science, organized in 1897 at Columbian University, and in which instruction is given in every department of library economy and administration.

PUBLIC LIBRARIES OF AUSTRALIA, ETC.

To mention merely the names of the chief Australian and other Colonial public libraries, outside of Canada, is about as much as can be attempted here.

The chief public library in Australia is that at Melbourne, established in 1853. It now contains considerably over 100,000 volumes, with about 25,000 pamphlets. The library is supported by an annual Parliamentary vote of about £5,000 or £6,000. Readers are admitted without any formality and have free access to the shelves.

Next in importance to the Melbourne Library is that at Sydney, which is said to contain the largest collection of works on Australasia. Other public libraries have been established in New South Wales, at Newcastle, Bathurst, Albury and elsewhere.

There are several other considerable libraries in Melbourne, in addition to the Public Library, and outside of the capital, the State of Victoria contains public libraries at Ballarat, Castlemaine, Geelong, and many other places.

In Queensland, the chief public library is at Brisbane. There is also a flourishing library at Adelaide, in South Australia ; and another at Perth, in Western Australia. Tasmania contains public libraries at Hobart and Launceton; and New Zealand, at Auckland, Christchurch, Dunedin and Wellington.

In Cape Colony, the most important library is that at Cape Town—the South African Public Library, which was established as long ago as 1818. It now contains 100,000 volumes, including the collection bequeathed by Sir George Grey, comprising besides MSS. and early printed books, an unrivalled collection of works in the native languages of Africa, Australia, etc.

Outside of Cape Town, there are (if they have survived the war) public libraries at Cradock, East London, Graff Reinet, Grahamstown, Kimberley, King Williamstown and Port Elizabeth. In Natal there are public libraries at Pietermaritzburg, Durban, etc. ; and in Rhodesia, at Bulawayo.[1]

---

[1] The following list of South African libraries appeared in the February number of *The Library World*, London, 1902:—

CAPE COLONY.

Name of Library.	*Estab.*	*No. of Books.*
Cape Town..	1818	100,000
Port Elizabeth.	1848	36,216
Grahamstown	1863	15,387
Kimberley.	1882	23,843

In the West Indies, public libraries have been established at Antigua, Barbados, Nassau (Jamaica), Grenada and Trinidad. There is a public library at Port Louis, on the Island of Mauritius; two at Colombo, Ceylon; one at Singapore, one at Malacca, another at Penang, and finally, one at Hong Kong.

CANADIAN PUBLIC LIBRARIES.

The history of free public libraries in Canada is almost too recent for consideration at the present time. Outside of the Province of Ontario, they may be numbered upon one's fingers—with a good margin over. Of course if one takes account of other than municipal free libraries—which is the especial field of this paper—the showing is a trifle more creditable. In a report published in 1893 by the United States Bureau of Education, relating to public libraries, detailed statistics are given of the various libraries of Canada.[1] From these statistics it appears that, in 1891, there were altogether some 202 public libraries in the Dominion,[2] containing 1,392,366 volumes and 86,544 pamphlets. Of these, 152 libraries, or over three-quarters of the entire number, with 821,198 books and 42,134 pamphlets, were in Ontario; 27 libraries, or over on-half of the remaining number with 459,781 volumes and 31,073 pamphlets, were in Quebec; and the remainder were scattered over the other provinces. Of the 202 libraries, only 17 were strictly speaking free public libraries. There

---

NATAL.

Name of Library.	*Estab.*	*No. of Books.*
Pietermaritzburg	1851	11,261
Durban	1853	12,368
Verulam	1857	2,794
Richmond Inst.	1865	2,500
Ladysmith	1872	
Pinetown	1873	1,100
Greytown Inst.	1874	2,759
Eastcourt	1875	2,300
Ixopo	1880	2,310
Newcastle	1880	3,200
Isipingo	1880	
Howick Jubilee	1883	1,022
Polela	1885	500
Harding Circulating	1886	400
Dundee	1891	
Sterk Spruit	1896	450
Stanger	1898	419

[1] Prepared by Mr. James Bain, Jr., Chief Librarian of the Toronto Public Library.

[2] These include only libraries containing at least 1,000 volumes.

were 109 Mechanics Institutes, all in Ontario, with the exception of one at Sherbrooke, P. Q. (The Ontario Mechanics Institutes have since been transformed into public libraries by an Act of the Legislature of Ontario.) Of the rest, 37 were university and college libraries; 19 law libraries; 8 parliamentary; and the remainder medical, historical and scientific.[1]

The oldest library in Canada is that of Laval University, Quebec, founded about 200 years ago. It now contains over 100,000 volumes, besides a large number of very valuable manuscripts relating to the early history of Canada.

The earliest subscription or co-operative library in Canada was the Quebec Library, established in 1779.[2] On January 7th, 1779, the following advertisement appeared in the *Quebec Gazette*:—

> "A subscription has been commenced for establishing a publick library for the city and district of Quebec. It has met with the approbation of His Excellency the Governor-General and of the Bishop, and it is hoped that the institution, so particularly useful in this country, will be generally encouraged. A list of those who have already subscribed is lodged at the Secretary's Office, where those who chuse it, may have an opportunity to add there names. The subscribers are requested to attend at the Bishop's Palace, at 12 o'clock, the 15th instant, in order to chuse trustees for the Library."

The meeting was duly held, and resulted in the election of a board of trustees, and the passing of certain regulations for the governance of the library. The subscription was placed at £5 on entering, and £2 annually afterwards. Books were only lent out to subscribers. The public were assured that "no books contrary to religion or good morals, would be permitted." In 1822 the library had been removed from the Bishop's Palace and occupied rooms on St. Peter Street, in the Lower Town. There were then some 4,000 volumes on the shelves.

In 1843 another library was established at Quebec, known as the Quebec Library Association. Some years afterwards the old Quebec Library amalgamated with the Library Association. In 1854 the Parliament Buildings were destroyed by fire, and a large portion of the books of the Quebec Library Association, which had been housed there, were burnt. In 1866 a catalogue was printed showing 6990 volumes in the library; and the following year the books were sold to the Quebec Literary and Historical Society; and the Quebec Library

---

[1] See Appendix for further statistics regarding Canadian public libraries.

[2] A very interesting account of the origin and history of the library of the Literary & Historical Society, and of the Quebec Library, and Quebec Library Association, by Mr. Frederick C. Würtele, will be found in the Transactions of the Lit. and Hist. Soc. of Quebec, No. 19, 1889, pp. 29-70.

Association, with the original Quebec Library, came to an end. The Quebec Literary and Historical Society, which was founded in 1824, chiefly through the instrumentality of the then Governor General, the Earl of Dalhousie, has been an important factor in the intellectual life of Quebec ever since. It has published a number of volumes of valuable transactions, and its library now contains some 25,000 books and pamphlets.

The only other libraries of any importance in the Province of Quebec are those of McGill University, established in 1855, and now containing 89,000 volumes, besides about 10,000 pamphlets (McGill is the only Canadian library using Cutter's Expansive System); the Fraser Institute, Montreal, endowed by Hugh Fraser, opened in 1885, and now containing 39,000 volumes; and the Sherbrooke Library and Art Union, the only remaining example of the once popular Mechanics Institutes, which spread from England to America many years ago, and in their day did good work. Their places are now, however, much more effectively in every way taken by public libraries supported by municipal rates, and open to the public in the widest possible sense.

Among Canadian libraries the premier place must, of course, be given to the Library of Parliament at Ottawa, an institution which bears (*or ought to bear*) a somewhat similar relation to Canada, to that occupied by the Library of Congress, and the British Museum, in their respective countries. It is housed in a building which may be said without exaggeration to be the most beautiful library building in America,—if we except the mural decorations of the Boston Public Library, and of the Library of Congress. It is questionable, however, whether the Library of Parliament is, even relatively, of the same value to Canadian scholars and students as the great national libraries of England and the United States. This is not through any particular fault of the staff, who are almost uniformly courteous and obliging, but mainly because of the antiquated and cumbrous system by which the library is managed, and the absence of any desire on the part of the authorities to make the library one truly national in scope and helpfulness, rather than purely and simply a library for the use of members of Parliament during the few months of the session. Surely, librarians and the friends of libraries in Canada, are not unreasonable when they hope for the inauguration of a more effective and far-reaching policy as respects the Library of Parliament; a policy which will make that library, with its really splendid collections of books, the centre for all that is best in modern librarianship, a source of inspiration and helpfulness to other Canadian libraries, and of wide usefulness tc scholars and students and all who may seek information from its increasing stores of books. It will then be in the truest sense a national library.

Of public libraries, in the stricter sense of the term, the great majority, as has already been stated, are in Ontario, and the chief of these is the Public Library at Toronto, with its five very active branches. This library system, under the able direction of Mr. James Bain, is doing, in a perfectly unostentatious way, a splendid work in Toronto. It reaches, through its branches, every quarter of the city, and its reference library is one of the best in Canada. In its methods it aims to make the library of the widest possible helpfulness to the community, and to keep its books, not on the shelves, but in the houses of the people. There are now some 111,725 volumes in the main library and branches, of which 37,297 are in the reference department of the main library.

Next in importance to the Toronto Public Library is that at Hamilton, in which several admirable features of modern library management have been adopted, with ample success. The books are classified according to the Dewey System, and an indicator is in use for the assistance of readers. There are at present 28,000 books on the shelves.

The most important of the other public libraries in Ontario are those at London, Brantford, Guelph, Kingston, Preston, St. Catharines, Lindsay, Berlin, St. Thomas, Waterloo, Sarnia and Stratford.

In the Lower Provinces there are only two municipal free libraries, one at St. John, and the other at Halifax. Both are doing good work in their respective communities, and the Halifax Library, especially, has lately been re-organized and re-classified on a modern basis. A printed catalogue, arranged on the Dewey System, was published in 1900. There are at present some 13,000 volumes in the library. The St. John Library contains about 11,000.

The only public libraries in the west are those at Winnipeg, Victoria, Vancouver and New Westminster. These libraries are still in their infancy, but will doubtless prove a boon to the people, and lead to the establishment of similar libraries in other western Canadian towns.

Two features of the Ontario library system that are bound to bear an increasing influence upon the development and usefulness of public libraries in the province, are the existence of a carefully constructed Provincial Act governing the establishment and maintenance of public libraries; and the organization of the Ontario Library Association. The latter, although only a year or two old, is already making its influence markedly felt not only upon the libraries in the province, but indirectly throughout the Dominion, in encouraging the establishment of modern methods and appliances, and generally making our public libraries of wide educational value.

It would not be just to close this brief sketch of the present state of Canadian public libraries, without mentioning the munificent generosity of Mr. Andrew Carnegie. The same broad-minded spirit which has led Mr. Carnegie to build public libraries in almost every quarter of his adopted country, and throughout his native Scotland, now embraces Canada as well. In Ottawa, Halifax, Vancouver, Winnipeg and many other Canadian cities and towns, our people have good reason to appreciate the munificence of the great steel maker.[1]

CATALOGUES AND CATALOGUING.

Modern cataloguing dates from the famous code of ninety-one rules, prepared under the direction of Sir Anthony Panizzi, greatest of modern librarians, and published in 1841. These rules were prepared for use in the British Museum, of which Panizzi was then Keeper, but they have since been adopted, with certain changes and modifications, by most of the libraries and librarians of England and America. When these rules were considered before the Royal Commission appointed in 1847 to inquire into the constitution and government of the Museum, some curious evidence was adduced. Even such eminent librarians as Mr. J. G. Cochrane, of the London Library, objected to the rules *in toto,* maintaining that "they were more calculated to perplex and to mystify than to answer any useful purpose." When Mr. Cochrane was asked the question "Do you object to rules in

---

[1] The following is a list of the gifts of Mr. Carnegie to Canadian libraries, up to the end of April, 1902:—

Berlin, Ont.	$ 15,000	Sault Ste. Marie, Ont.	$ 10,000
Chatham, Ont.	15.000	Sherbrooke, Que.	15,000
Collingwood, Ont.	12,500	Smith's Falls, Ont.	10,000
Cornwall, Ont.	7,000	St. Catharines, Ont.	20,000
Goderich, Ont.	10,000	St. John, N.B.	50,000
Guelph, Ont.	20,000	St. Thomas, Ont.	15,000
Halifax, N.S.	75,000	Stratford, Ont.	12,000
Lindsay, Ont.	10,000	Sydney, N.S.	15,000
London, Ont.	10,000	Vancouver, B.C.	50,000
Montreal, Que.	150,000	Victoria, B.C.	50,000
Ottawa, Ont.	100,000	Windsor, Ont.	20,000
Palmerston, Ont.	6,000	Winnipeg, Man.	100,000
Pembroke, Ont.	10,000	Yarmouth, N.S.	4,000
Sarnia, Ont.	15,000		

This makes a total of $826,500, to which may be added $50,000 for a library in St. John's, Newfoundland.

any compilation of catalogues?" He said, "Yes, very much." Many witnesses strongly objected to the rule that whoever wanted a book must look it out in the catalogue, and copy the title on a slip with the press-mark before he could receive it—a rule that has since been almost universally adopted in public libraries. Mr. Carlyle, with characteristic crankiness, preferred to get his books elsewhere rather than submit to the rule. "I had occasion" he says, "at one time to consult a good many of the pamphlets respecting the Civil War period of the history of England. I supposed these pamphlets to be standing in their own room, on shelves contiguous to each other. I marked on the paper 'King's Pamphlets' such and such a number, giving a description undeniably pointing to the volume; and the servant to whom I gave this paper at first said that he could not serve me with the volume, and that I must find it out in the catalogue and state the press-mark, and all the other formalities. Being a little provoked with that state of things, I declared that I would not seek for the book in that form; that I could get no good out of these pamphlets on such terms; that I must give them up rather, and go my ways, and try to make the grievance known in some proper quarter."

Professor Charles Coffin Jewett, of the Smithsonian Institution, Washington, prepared a code of cataloguing rules, which he published in 1853 in a pamphlet entitled "Smithsonian Report on the Construction of Catalogues of Libraries, and their Publication by means of Separate Titles, with Rules and Examples." Mr. Jewett's rules were founded upon those of the British Museum ; some of them are verbatim; others conform more to rules advocated by Panizzi but not finally sanctioned by the Trustees of the Museum. Jewett's rules are classified as follows: pp. 1-45, Titles; pp. 45-56, Headings; pp. 57-59, Cross-references; pp. 59-62, Arrangement; pp. 62, 63, Maps, engravings, etc.; p. 64, Exceptional cases. These rules, with some exceptions and modifications, were afterwards adopted by the Boston Public Library.

Another code of rules founded largely upon Panizzi's, was that drawn up at Cambridge University—"Rules to be observed in forming the Alphabetical Catalogue of Printed Books in the University Library." With the exception of some alterations made in 1879, these rules, forty-nine in all, now stand substantially as originally adopted.

The rules of the Library Association of the United Kingdom were originally formed for the purpose of making a foundation for a gigantic work suggested by the late Mr. Cornelius Walford,—a Catalogue of English Literature. The plan for this catalogue fell through, but the rules remained, and were adapted to the purposes of a general library catalogue. They have been amended on several occasions since.

The Library Association rules were at one time adopted for the catalogue of the Bodleian Library, but in 1882 Mr. Edward B. Nicholson, the librarian, arranged and had printed a set of "Compendious Cataloguing Rules for the Author-Catalogue of the Bodleian Library," which has since been added to, and now numbers sixty rules.

But the most important of all these codes of cataloguing rules is undoubtedly Mr. Charles A. Cutter's "Rules for a Printed Dictionary Catalogue," first published in 1876 as the second part of the "Special Report on Public Libraries in the United States." Mr. Cutter not only goes much more minutely into every division and sub-division of his subject than any of his predecessors, but he also sets out clearly and forcibly the reasons on which each rule is founded, making his work of inestimable benefit to the librarian, and especially to the cataloguer. Mr. H. B. Wheatley, the well-known English librarian, while strongly combatting many of Cutter's rules, and the arguments advanced in support of them, acknowledges fully and frankly that "it would be difficult to find anywhere in so small a space so many sound bibliographical principles elucidated."

Mr. Wheatley's own little book, "How to Catalogue a Library," is an extremely interesting and instructive contribution to the available literature on the subject. It furnishes, in compact and lucid form, a statement of the first principles of cataloguing, with an impartial discussion of the most notable codes, English and American.

The American Library Association, like its sister body of Great Britain, has also put forth a collection of rules, entitled "Condensed Rules for an Author and Title Catalog."

Another American work on the subject is Mr. F. B. Perkins' "Cataloguing for Public Libraries," San Francisco.

Two codes of rules for card catalogues are Mr. Melvil Dewey's "Library School Card Catalog Rules"; and Mr. K. A. Linderfelt's "Eclectic Card Catalogue Rules; Author and Title Entries." Mr. Linderfelt's elaborate work is based on the German code of Dziatzko, librarian of the Breslau Library, compared with the rules of the British Museum, Cutter, Dewey, Perkins, and other authorities.

In his article on "Cataloguing"—one of the "Papers Prepared for the World's Library Congress"—Mr. Wm. C. Lane, Librarian of the Boston Athenæum, summarizes the points of general agreement in regard to a library catalogue. These points are briefly as follows:—

1. The necessity of a comprehensive and detailed card catalogue.

If a carefully made and reasonably full printed catalogue exists, the card catalogue may form simply a supplement to this, but if the printed catalogue be only a finding list, or short-title catalogue, the card catalogue should be complete in itself.

Its forms are various: in drawers, in trays open on a counter, in sliding trays, in a Rudolph indexer, or slips mounted on the leaves of a book. In any case the point to be provided for is the possibility of inserting new titles indefinitely in strict alphabetic or other specified order.

2. On this catalogue every work should have at least an author or (when this is impossible, as in the case of anonymous works, periodicals, etc.) a title entry.

A common English custom is to use for certain classes of works, form or subject entry *only*; such are, almanacs, catalogues, society or academy publications, periodicals, etc. The nearly universal American usage is to treat these works like any other.

3. In addition to author or title entry most works should also be entered under the name of the subject of which they treat.

4. The author's name should if possible be given in the vernacular, unless all his works have been published in some other language than that of his own nationality. Latin must often be considered the vernacular of mediæval names.

5. On author cards titles should be brief, and the author's name and bibliographic details should be given in full. On subject cards the title should be fuller and descriptive, but the author's name may be given with initials only, and some of the more technical or minute bibliographic details may be omitted.

6. In transcribing titles the words and spelling of the title-page should be strictly adhered to, any addition or deviation being plainly indicated by brackets.

In addition to the above main points of agreement, there are several smaller matters on which substantial unanimity exists. These are, as to the treatment of names with prefixes, compound names, capitals, numerals, periodicals, names beginning with Mc or St, and reports of trials.

There are several different forms, and several different kinds of catalogue, in use. The chief forms are: Printed catalogue, with printed supplements. Printed catalogue, with card supplement. On cards complete. On slips pasted in volumes—the British Museum plan. On slips fastened in bunches like the leaves of a book—the Leyden plan; which is also being tried at Harvard. The Rudolph Indexer or books. To these may be added; printed finding-lists or other abbreviated forms of catalogues; and, printed bulletins of recent accessions. Of these forms, the printed and the manuscript, or a combination of both, are in chief favour in England; while the popular form in the United States is the card catalogue. In Australia and in Canada the practice is somewhat haphazard, opinion seeming to be impartially divided among all the various forms.

The kinds of catalogues[1] may be divided into two general classes—those in which author and subject entries are distinct and separate; and those in which author and subject entries are combined in a single alphabet. The former class may be subdivided into four smaller groups:

A. Subject catalogues in dictionary form.

B. Classified on the decimal system (Dewey's).

C. Classified on some other system (Cutter's, Harris', etc).

D. Alphabetico-classed subject catalogue, *i.e.*, a catalogue having general classes in alphabetic sequence, with alphabetic subdivisions.

Of the several systems of classification, the decimal system devised by Mr. Melvil Dewey is most generally used. It has been adopted by a large majority of public libraries in the United States, and is making considerable headway in England. It is also used in a few Canadian and Australian libraries. It has won the approval of several leading European librarians, but has as yet been adopted by very few, if any, libraries on the Continent. The decimal system has been fully described by Mr. Dewey in an elaborate paper published in the "Special Report on Public Libraries in the United States" (pp. 623-648). Under this system the whole field of human knowledge is divided into ten classes; each of these is then sub-divided into ten divisions of the main class; and each of these, again, is further sub-divided into ten. This sub-division may, of course, be carried out indefinitely, and thus provide for the most minute classification. It is this division into tens that gives the system the name of decimal. The main classes are: General Works, Philosophy, Sociology, Philology, Natural Science, Useful Arts, Fine Arts, Literature, History. The chief advantage claimed for the system is its adaptability to the needs of any library, large or small, general or special. As an instance of the minuteness with which the classification may be carried out, take the case of a work on Strikes. The number for this would be 331.89; the first figure representing the general class Sociology; the second, the division Political Economy; the third, the section devoted to Capital, Labour and Wages; the fourth, Labouring Classes; and the fifth, Strikes. The main classification only covers three figures, any further sub-division being carried beyond the decimal point.

---

[1] The late Mr. Justin Winsor gave this admirable advice as to the use of cataloguing systems:—

"Each of two systems under proper conditions may be equally good, when both are understood and an equal familiarity has been acquired with each. Choose that which you naturally take to; use it, and do not decide that the other is not perfectly satisfactory to him who chose that. Whichever you have chosen, study to improve it, and you will probably do so, in so far as it becomes fitted more closely to the individuality of yourself and your library."

Mr. C. A. Cutter devised some years ago a system which he calls the Expansive Classification. Briefly it consists of seven tables of classification, of progressive fulness, designed to meet the needs of a library at its successive stages of growth, and so arranged that the transfer from one classification to a closer or more minute one, can be made with comparatively little trouble. The main classes are: General Works, Philosophy, Religion, Biography, History, Geography and Travels, Social Sciences, Natural Sciences, Medicine, Useful Arts, Fine Arts, Arts of Communication by Language. Fiction, Poetry, etc., are included in the last section.

From the point of view of the practical librarian, catalogues are subject to still another division. In addition to the classes of catalogues which are open to the public, and with which we are all familiar, there are several which belong to the internal economy of the library, and are used only by the staff.

The first of these is the Accession Catalogue, in which the history of every book acquired either by purchase or gift, is recorded; when it was acquired, its accession number, its class, book and volume number, a short title, place and date of publication, size, binding, cost, etc., with a remarks column in which is noted its subsequent history, whether it is rebound, transferred, lost, sold, condemned or exchanged.

The index is the official authors' catalogue, for use by the librarians in checking the public authors' catalogue, which is prepared from it.

The shelf list is the official subject catalogue. It represents the actual arrangement of the books on the shelves. It is generally on loose sheets, laced together, and gives the class, book and volume number of each volume, together with its accession number, author, and short title. It is used in the annual examination of the library, and also serves as the librarian's subject catalogue, giving a compact list of all the books which the library has on any given subject.

The greatest of all catalogues is, of course, the Catalogue of Printed Books in the British Museum, the printing of which was begun in 1880 and completed by the end of the century. The catalogue contains separate entries of every book, pamphlet, magazine, newspaper and broadside or single-sheet in the library, with the exception of a few collections of books and pamphlets which are covered by special catalogues.

Up to 1897 the British Museum was the only library of the first rank that had printed its general catalogue, either by author or subject. In August of that year there appeared the first volume of the general alphabetical catalogue of the Bibliothèque Nationale. The catalogue is preceded by a learned introduction by M. Léopold Delisle, giving the history of the library and its various catalogues, and describing the scope of the new undertaking. It is expected to contain about two million entries, including, however, a number of cross-references from editors, translators, etc.

One of the most notable of European library catalogues is that in use at the Royal Library at Breslau. Dr. Dziatzko, formerly librarian at Breslau, and now of the University of Göttingen, originated this catalogue. Dr. Dziatzko's system, which has already been mentioned as the main source of Linderfelt's Code, was itself founded upon the British Museum rules, with certain important modifications. The Breslau catalogue is not a book catalogue, like that of the British Museum, but a card catalogue.

The dictionary catalogue is peculiarly an American invention, and very few specimens are to be found outside of the United States. One may be mentioned, however, the "Analytical and Classified Catalogue of the Library of Parliament of Queensland," 1883, prepared by Mr. D. O'Donovan, Parliamentary Librarian. The books are entered under author and subject with full cross-references, and all the entries are arranged in one alphabet. There are abstracts of the contents of some of the books, and references to articles in reviews. The finest example of this type of catalogue is, of course, that of the Surgeon-General's Office, Washington, but the tremendous amount of money and labour expended upon this catalogue makes it improbable that any other library will attempt to carry out the dictionary principle so exhaustively.

Mr. Cutter, in the introduction to his "Rules for a Dictionary Catalogue," gives the following analysis of this form of catalogue:—It must embody: Author-entry, title-entry or title-reference, subject-entry, cross-references and classed subject table, form-entry, the edition and imprint, with notes bibliographical and literary where necessary. It is designed to serve the following purposes: To enable a person to find a book of which either the author, the title, or the subject is known. To show what a library has, by a given author, on a given subject, or in a given kind of literature. To assist in the choice of a book, as to its edition (bibliographically), or, as to its character (literary or topical).

The dictionary catalogue includes practically the advantages of every other kind of catalogue. It answers every legitimate question that the reader or student may ask as to the books of which it is the record. It is, therefore, if properly constructed, of inestimable benefit to the constituents of any library, large or small.

The arrangement of books upon the shelves may be roughly divided into two classes : the fixed location system ; and the relative location. The former has been adopted at the British Museum, the Bodleian, and most of the larger libraries of England and the Continent. About the only American library which uses it is that of Cornell University. The relative location is practically universal in the United States; and has also been adopted by some of the modern English free libraries, the newer portions of the Cambridge University Library, and in the Bibliothèque Nationale. In the fixed location system, the books are arranged in definite book-cases, each of which has a number or letter which forms part of the press-mark of the book. In the relative location, the books are arranged not with regard to any particular book-case or shelf, but with regard to each other. They run along the shelves, free from either the wasteful gaps, or inconvenient crowding, inevitable in the fixed location.

> "If you are troubled with a pride of accuracy, and would have it completely taken out of you, print a catalogue."—*Henry Stevens.*

References on Cataloguing and Classification:—

Cataloguing : *Enc. Britt.*, XIV., pp. 537, 539.

Report U.S. Libraries, p. 399 (special and complete catalogues); 425; 489 (cataloguing); 495 (shelf lists); 496 (finding lists). 497 (printed catalogues); 512 (cataloguing college libraries); 552 (printed or MSS.?); 645 (subject catalogues); 648 (dictionary catalogues); 657, 660 (classed catalogues).

Papers prepared for World's Lib. Cong., 826 *et seq.*

Library Administration, by J. Macfarlane, London, 1898; p. 78.

How to Catalogue a Library, by H. B. Wheatley, London, 1889.

Denver Library Hand-Book, pp. 59 (card catalogues); 108-111 (what questions a catalogue should answer, etc.) ; 117-120 (dictionary catalogue).

Essays in Librarianship, by Dr. R. Garnett, London (1899), pp. 83, 84, 109-114 (British Museum catalogue).

The Free Library, by J. J. Ogle, London (1897), p. 125.

Home Education Report (Univ. of State of N.Y.), 1899, p. 89 (card catalogues).

Classification: *Enc. Britt.*, III., 661.

How to Catalogue a Library (Wheatley), 47.

Report U.S. Libraries, 492, 623 *et seq.*

Denver Library Hand-Book, 112-115, 124.

Library Administration (Marfarlane), 148.

Essays in Librarianship (Garnett), 210 *et seq.*

Papers prepared for World's Lib. Cong., 861. At p. 893 will be found a very full list of references on classification.

THE OPEN SHELF SYSTEM.

This system is one of the most recent developments in library administration. While the idea itself is not very new, its distinctive application belongs to the past decade, and the initiation of the system must be credited to American libraries and librarians. In a limited sense, open access to the book shelves has been in operation for many years past in the British Museum, the French National Library at Paris, and other English and Continental libraries. In the reading-room of the British Museum some 20,000 carefully selected books are open to the public; and in the Salle de Travail of the Bibliothèque Nationale about 12,000 are made available in this way.

In the United States the principle has been carried to its logical conclusion in several prominent libraries, by throwing practically the whole resources of the library open to the public. Many other American libraries have contented themselves with the more conservative system of the British Museum, by placing a certain number of selected books in one room, generally called the "Open Shelf Room," where they may be consulted by readers without the intervention of the library attendants.

An admirable example of the successful working of the Open Shelf System as applied to an entire library, is furnished by the Philadelphia Public Library. Here the books are conveniently classified, and the visitor or reader may go direct to the shelves and examine the authorities on any given subject to his heart's content, or pick out the book he wants and carry it to a neighbouring table. The success of the system at Philadelphia has been all that its most devoted adherents could desire.

Professor Adams, of Johns Hopkins University, has clearly stated the case for the Open Shelf System in the course of an elaborate paper on "Public Libraries and Popular Education." He says: "The old method of guiding readers in the use of books was the printed catalogue; but public experience in America long ago demonstrated that men and women want to see the *books* rather than the mere *titles* of books. A brief examination of a printed volume soon convinces the reader whether he wants to read that particular book. Moreover, access to a varied collection of authorities on one subject, like that of money, or labour, China, or Cuba, quickly determines the reader's choice. Oldtime methods of scholastic administration often raised barriers between the books and the people, just as medieval theories raised monastic walls between social life and religion."

In the Astor Library, the New York Circulating, and other libraries of the American metropolis, the open shelf system is reported to be a pronounced success. In the New York Circulating Library the system has been extended to nearly all its numerous branches throughout the city, and free access to the shelves is permitted even to children over nine years of age.

At Buffalo a large room is devoted to the purposes of open access. Here some 11,000 books are classified in cases around the walls. A number of reading tables fill the centre of the room, and the reader may forage around, picking out what he wants from the shelves. In the Buffalo Library, as in most of the American libraries that have adopted the Open Access System, the books are not put back on the shelves by readers, but are left on a central table, to be replaced by the attendants. This obviates one of the chief objections to the system raised by English librarians, that the books would become hopelessly mixed through the carelessness of readers in not returning them to their proper places on the shelves.

In the Reynolds Library at Rochester, a similar arrangement is in existence. On the ground floor there is a reference or study library with some 3,000 books most in demand, which are directly accessible to the public. Here, as in other American libraries, a reference librarian is always on hand, to advise and assist readers, but in no way to interfere with their free access to the shelves.

Many other cases might be cited of American libraries which have adopted this admirable system, as, for instance, the Cleveland Library, where it is claimed to have increased the circulation of the books 60 per cent in a very short time. From present indications the system is bound to grow in favour, on both sides of the Atlantic.

In his admirable article on "College Library Administration," forming part of the voluminous report on "Public Libraries in the United States," Professor Ottis H. Robinson made a strong plea for the Open Access System as applied to college libraries, and his argument is equally applicable to the case of a public library. The plea that in a public library such a privilege would be taken advantage of by frivolous or careless readers, to the great detriment of the books, is not borne out by the experience of those libraries that have tried the experiment. It has been found — as any thoughtful man might have predicted — that the classes of people who take advantage of the privilege are the serious-minded readers, the students, the genuine seekers after knowledge. As for the idle or frivolous reader, he still prefers that the library attendants should relieve him from the task of choosing a book. And even if this were not so, is it not better and wiser to take chances of a few books being lost or damaged, rather than deny to serious readers the immense advantage of personal contact with the books as they lie classified on the shelves? The time spent in browsing around among the books is never lost. As for the further objection that Open Access will prove an added temptation and opportunity to evil-disposed persons, it need only be stated that a reasonable supervision should in any event be kept over rooms where books are made freely accessible to the public, and if this is done there need be no great fear of book thieves.

"Remove the barriers," says Professor Robinson, "and make familiarity with well chosen authors as easy as practicable. No habit is more uncertain or more capricious than that of a student in a library. He wants to thumb the books which he cannot call for by name. It is not an idle curiosity. He wants to know, and has a right to know, a good deal more about them than can be learned from teachers and catalogues. Deny him this, and he turns away disappointed and discouraged; grant him this, and his interest is awakened, his love for books increased, and the habit of reading will most likely be formed."

. OPEN SHELF VS. INDICATOR.

In England the question has developed into one of Open Shelf *vs.* Indicator. The use of indicators is very widespread in Great Britain; but the device is practically unknown in the United States. In Australia and in Canada it has found a few adherents. In England the rival system of "open access" is steadily gaining ground, and there seems reason for believing that it will ultimately displace the indicator.

The Indicator is an arrangement for showing whether or not a given book is in or out. There are a number of varieties in use in English libraries, but by far the most popular is what is known as the "Cotgreave Indicator," from the name of its inventor. This indicator is in use in over sixty libraries in London alone, besides many in other parts of the Kingdom. The following description is taken from Macfarlane's work on "Library Administration," in Dr. Garnett's *Library Series* :—"It consists of an upright framework of wood or metal, fitted with minute zinc shelves without ends, which is placed in the library so that one side (protected with glass) is visible to the public, and the other accessible to the staff. On the shelves are placed title-ledgers of blank forms, in metal cases with ends, coloured red and blue respectively, and bearing numbers. When a case is inserted so that the blue end meets the public eye it is to be understood that the book bearing the number shown is 'in': when the red end is seen it is 'out'. The borrower having found in the catalogue the number of the book he requires, and seeing by the colour exhibited on his side of the Indicator that it is 'in,' hands in a request for it, together with his 'borrower's ticket.' The library assistant removes the corresponding ledger from its shelf, enters it in the number of the borrower's ticket and the date of the loan, places the ticket in the ledger, and replaces it so as to exhibit the 'out' colour to the public." Despite the popularity of the Indicator in England, one finds it hard to see how there can be any question as to the superiority of the Open Shelf System, combined with the modern charging system of cards and trays.

The first English public library to adopt the Open Shelf System, or "Open Access" as it is called in England, was that at Clerkenwell, whose librarian, Mr. James D. Brown, was sent over to the United States at the time of the Chicago Exhibition, by his unusually generous and far-sighted Library Committee, to study modern American library methods. Mr. Brown prefers the term "safeguarded access" as applied to the Open Shelf System, it being, he considers, more accurate, since it is admitted that various checks on readers and borrowers are necessary. At Clerkenwell the system applies to the circulating, but not to the reference library. The public "enter the library at one side of an enclosed counter in which an assistant is placed, and leave with him the books they are returning. After choosing a volume from the open shelves they bring it to the other side of the counter, where it is booked for them, and they then leave the library by a different door from the one by which they entered. The book-shelves are placed end on with the issue counter, so that an assistant stationed there can see between each, and has full control of the whole library."

A limited form of "open access" was tried at the Liverpool Public Library a few years ago, but has since been discontinued on account of the loss of the books. That this loss was not due to any weakness in the system so much as to defective supervision, is proved by the fact that the books were shelved in alcoves, where anything like adequate supervision would be impossible.

The system has been adopted in the Croydon Public Library, where it has proved eminently satisfactory, the library building having been arranged to suit the system.

In the Wigan Free Library, a special building for boys was opened in 1895, and here also a system of open shelving has been adopted.

At St. Martin's, London, open access is in vogue, but, reversing the Clerkenwell plan, it applies only to the reference department. An ingenious device is also in use here to keep readers informed as to recent additions to the library. It is known as the "wheel catalogue," and is placed under glazed portions of the counter. By means of a lever it is made to revolve and bring successively into view a long list of new book-titles arranged on the circumference of the wheel.

At Birmingham a limited form of open access is in operation. a large number of works of reference, now filling nearly fifty shelves, being made free to the public. This system applies also to the Aberdeen Library.

At Cardiff. in Wales, the open shelf system has been tried in four of the branches, but unfortunately the plan has been abused by systematic book thieves and consequently discredited.

The general experience, both in the United States and England, seems to have been that, with proper precautions, the loss of books is very small. The experience of the Boston Public Library has certainly been very unfortunate, for out of a juvenile library of 5,000 books, several hundred were lost in one year, but this was admittedly the result of a lack of reasonable supervision. The Minneapolis Public Library, on the other hand, issued several hundred "free access" permits in a year, and only lost three volumes from the reference shelves and a few odd numbers of periodicals. The experience at Philadelphia and New York has been practically the same. The losses from English libraries adopting the system have as a rule been very insignificant—at Clerkenwell about three volumes in a year. At the British Museum experience has shown that the only books at all likely to be purloined are the small portable volumes, of comparatively slight value. Until recently a set of "Murray's Guides" was placed in the reading room of the Museum for the use of readers, but these "used to vanish—not quite unaccountably—about the month of August, and either remain away, or come back in October stained with much trouble." Now "Murray" reclines upon a remote shelf, and one must send an attendant for him.

On the whole, the Open Shelf System would seem to have come to stay. It is only from the librarian's point of view, as custodian of the books, that there can be any question as to the desirability of the plan. From the reader's standpoint the system is one of inestimable benefit. And it must always be remembered, that it is not so much the convenience of librarians or libraries that is to be considered, but above all the convenience and benefit of the public, for whom solely the public library exists. As Mr. George Iles, a New York librarian, very justly said, "only when the full catalogue, whatever its form, and the shelves themselves are at the free disposal of the public, does the public library fully stand by the promise of its open door." [1]

---

[1] The Open Shelf, or Open Access, system has been very widely discussed during the past few years. The following references are merely suggestive.

LOAN OR CHARGING SYSTEM.

The primary requisites of any system for keeping a record of books borrowed in a public library, are speed, simplicity, and the minimum of trouble to the borrower. In some libraries readers are driven away by unnecessary and exasperating "red-tape"; and in others the efficiency of the library is sacrificed to the impatience of borrowers. Either extreme is in the long run fatal to the growth and efficiency of the library. And yet it is not always easy to attain that happy medium which should be the aim of every right-minded librarian. Borrowers are not always patient and reasonable — as instance the case of Mr. Carlyle, already referred to—and the temptation is doubtless often strong upon the well-meaning librarian to sacrifice accuracy and thoroughness upon the altar of popular favour.

The oldest of the various systems at present in use for charging books, is what is known as the Ledger System. In this system — which is widely used in English, Australian and Canadian libraries, as well as on the Continent,—the record of books borrowed and borrowers' names is kept in a ledger, each borrower having a separate page. When a book is taken out, the number is entered on the proper page, with the date, and when the book returns, the charge is cancelled. A day-book is frequently used with this system, for the sake of speedy charging. The advantages of the system are its permanent form, compactness, speed, and the fact that each borrower's record

---

and do not pretend to cover the literature of the subject with any approach to exhaustiveness:—

"Papers Prepared for the World's Library Congress," edited by Melvil Dewey. Washington, 1896. pp. 737, 924, 979, 989, 993.

"College Library Administration," by Prof. Otis H. Robinson, in "Report on Public Libraries in the United States." Washington, 1876. p. 516.

7th Annual Report (1899) Home Education Department. University of the State of New York. pp. 79, 84, 90, 152, 251.

"Freedom in Public Libraries," by William Howard Brett, in "Transactions and Proceedings, International Library Conference." London, 1898. pp. 79-83.

"Denver Library Hand-Book." pp. 14, 60.

"The Free Library," by J. J. Ogle. London, 1897. p. 101.

"Library Administration," by J. Macfarlane. London, 1898. pp. 78, 208, 211.

"Library Construction," by F. J. Burgoyne. London, 1897. pp. 169, 187, 205, 210.

Library Journal, V. 8, p. 241 (Foster), V. 13, p. 35 (Cornell), V. 15, pp. 100, 103, 133-4, 197-8, 229-31, 296 (Symposium on Open Access), V. 16, pp. 268-9 (Higginson), 297-300 (N.Y. Lib. Club), etc., etc.

Library Notes, V. 2, p. 216, V. 12, p. 189, V. 18, p. 181, V. 24, C136-42, etc., etc.

The Library (London), Ser. 2, V. 1 (Dec., 1899), pp. 49-62.

stands by itself. There are, however, many weaknesses in the system, chief of which is the practical impossibility of obtaining from it any information as to a given book.

A modification of the Ledger System is what is known as the Temporary Slip System. The slips may be used in the same way as the pages of the ledger, with the advantage that more than one person may be engaged in charging and discharging books. The slips are arranged in trays or in pigeonholes in any of three ways: (1) with guide cards or blocks for each day, making practically a daybook; (2) by borrower's name or number, making an account with the borrower; or, (3) by call number, making an account with the book. A suggestion has been made that by means of a carbon paper, such as is used by clerks in a dry-goods store, an extra copy of each slip might be made, and thus two records would be possible, one arranged by borrowers and the other by books.

The system most used in American libraries is the Card System. This is a further development of the Temporary Slip System. The record, being on durable cards, is permanent rather than temporary. In other respects the system is substantially the same. As a matter of fact, however, there are two card systems — the Single Card System and the Two Card System. The advantages of the former over the Temporary Slip System are comparatively slight; but the Two Card System has many important advantages. It is, on the whole, the most altogether satisfactory system that has yet been devised. There are two sets of cards — borrowers' and book cards, the latter kept usually in date order. The system is subject to a number of variations, but the arrangement generally used is that in which the borrower's card records the call number and date, and the book card the borrower's number and date. When a book is returned, the dating slip in it and the date of the borrower's card are compared, and if the same, the latter is marked with the date of return and handed back, while the book card is looked up by means of the number in the book, the date of return is noted on it, the card placed in a pocket on the inside cover of the book, or in a card indicator, and the book returned to the shelves.

The indicator, so widely used in English libraries, must also be mentioned among charging systems. There are a number of forms, and a description of the most popular, known as the "Cotgreave," is given elsewhere in this paper.

A feature that is common to some of the indicators as well as the card systems, is the movable date register or tray. The date register of the indicator has eleven columns for books not overdue, and one for overdue books. The date tray has fourteen compartments for the former, and one for the latter.

The trays move from right to left, and as to-day's circulation becomes yesterday's, its tray is moved one space to the left, while the fourteenth tray shows that all cards left in it represent books one day overdue, and the delinquents can thus be promptly notified.

Some years ago a list was prepared by the librarian of the Milwaukee Public Library, and published in the *Library Journal*, of 20 questions answered by the charging system of that library. Of these questions, it may be noted that only those relating to borrowers can as a rule be answered by the Ledger System. Three or four additional questions may be answered by the Temporary Slip System, and the Single Card System. The Two Card System answers nearly all. The list is as follows (the additions in brackets having been added by Miss Plummer, of the Pratt Institute, in a paper on "Loan Systems"): —

1. Is a given book out ?
2. If out, who has it ?
3. When did he take it ?
4. When is it to be sent for as overdue ?
5. Has the book ever been out ?
6. How many times and when has the book been out ?
7. How many (and what) books were issued on a given day ?

7a. How many (and what) books are due on a given day ?

8. How many (and what) books in each class were issued on a given day?
9. How many (and what) books are now out, charged to borrowers ?
10. How many (and what) books are at the bindery ?
11. Has a certain book been rebound, and when ?
12. What books have been discarded ?
13. Does the circulation of a discarded book warrant its being replaced ?
14. Has a given borrower a book charged to him ?

14a. (How many books are charged to him ?)

14b. (What books are charged to him ?)

15. How many persons have now books charged to them ?
16. Are these the persons who registered earliest or latest ?
17. How often has a borrower made use of the library ?
18. Has a borrower had a given book before ?
19. What has been the character of the borrower's reading ?
20. Is the borrower's card still in force and used ?

20a. (Has this person a right to draw books ?)

Questions 10, 11 and 12 are answered, in most libraries, by a reference to the Accession Book.

In the Proceedings of the American Library Association for 1889, pp. 203-214, will be found an admirable historical treatment of Charging Systems, in the United States, by Mr. H. J. Carr. In an appendix to Mr. Carr's report is given a bibliography of Charging Systems from 1876 to 1888. The subject has been frequently dealt with since 1888 in the *American Library Journal*. See :

Functions of a Librarian.

Nowhere is the difference more marked between the old and new conceptions of librarianship, than in the duties of the librarian, his attitude towards the library and his attitude towards the public. Under the old dispensation the librarian was merely a custodian of books. Books were few; readers were fewer; the librarian had very little to do, and was estimated accordingly. He was considered to be, and as a matter of fact generally was, a comparatively useless member of society. One John Durie published a little book, in 1650, "The Reformed Librarie-Keeper," in which he drew a very unflattering picture of the librarians of his day. "They subordinate," he says, "all the advantages of their places to purchase mainly two things thereby, viz., an easie subsistence, and some credit in comparison with others; nor is the last much regarded, if the first may be had." He then proceeds to set forth what he considers the "proper charge of the Honorarie Librarie-keeper," to wit, "to keep the publick stock of learning, which is in Books and Manuscripts, to increas it, and to propose to others in the waie which may be most useful unto all"; from which one gathers that John Durie was a man several hundred years in advance of his age. Among other things, he recommended a "Catalogue of Additionals," to be printed every three years.

An English librarian of our own times, Mr. Henry Bradshaw, gives in a single sentence an admirable definition of the ideal librarian. "A librarian," he says, "is one who earns his living by attending to the wants of those for whose use the library under his charge exists; his primary duty being, in the widest possible sense of the phrase, to save the time of those who seek his services." And to this might be added the qualification suggested by an American librarian, Mrs. M. A. Sanders — herself a striking example of the success of her theory — "the librarian should meet the reader in the position of a host or hostess welcoming a guest."

Unfortunately, even in these latter days there are not wanting people, and educated people too, whose conception of the librarian and his work is a conception that belongs to the seventeenth or eighteenth century. According to their idea, his chief duty consists in handing books over a counter to the library's customers. How surprised they would be to be told that the conscientious librarian—the librarian who has the best interests of his library at heart—gives, and must give, not an hour or two daily, but his whole waking thoughts,

---

1889, 14: 213-14; 1899, 14: 468-9; 1889, 14: 281; 1891, 16: 232; 1891, 16: C51-2; 1891, 16: 246; 1891, 16: 334-4; 1893, 18: 42.

to the innumerable problems that confront him from morning till night. Trained intelligence, a genuine love for and wide knowledge of good literature, business acumen, native courtesy and helpfulness, tact and discrimination, a good memory, patience, breadth of view; these are some of the essential characteristics of the successful modern librarian. The day has happily gone when the office of a librarian was merely a refuge for some broken-down politician, unsuccessful school-teacher, or man who had made a failure of his profession, whatever it might be. Librarianship is now an honourable profession, the world over. Careful study and preparation is required of those who aspire to the position either of a librarian or library assistant; and it is even beginning to be recognized by Library Committees that a man or a woman possessing the requisite qualifications is entitled to a fair remuneration.

We are merely upon the threshold of a new era in the history of public libraries. What the present century may see, in the direction of increasing and broadening their mission as factors in the educational life of the community, it would be difficult to foretell, but that that influence will be deep and lasting, everyone who has studied the recent development of public libraries, especially in the United States and England, must feel heartily assured.

APPENDIX.

For the benefit of those who might be sufficiently interested in the subject of Canadian libraries, the writer prepared a list of questions, which were submitted to the librarians of all the more important public libraries throughout the Dominion. Through the courtesy of these officers, very complete answers have been secured to the several questions submitted, the substance of which will be found below.

No attempt has been made to procure data from all the Ontario libraries, of which the last Report of the Minister of Education for that Province (1901) records 432 in existence, divided into 303 "Public Libraries" and 129 "Free Libraries," but a certain number of the larger and more representative Ontario libraries were selected, as to which somewhat fuller particulars have been procured than are to be found in the tables of the Education Report. These latter tables con-

---

A series of works that will be found of inestimable advantage to librarians, library assistants, and those who may be preparing themselves for the profession, is *The Library Series*, edited by Dr. Richard Garnett, formerly of the British Museum. The series is in five volumes, each devoted to a particular branch of library work: construction, administration, etc. The books are published by George Allen, London, England.

tain a statement of receipts, expenditure, balance on hand, number of members, number of volumes in library, number of volumes issued, number of newspapers and periodicals, assets, and liabilities, for each of the Ontario libraries reporting to the Department. The list of questions which I submitted was as follows:—

When was library first established ?
Is it in a special building, or where ?
How is it supported ?
What is the total income ?
How many on the staff ?
What salaries paid ?
Have you any branches ?
How many assistants in each ?
How many books at present ?
How many pamphlets ?
What catalogues used—card, printed, or manuscript ?
What system of classification ?
Do you prefer any other system ?
Do you use any and if so, what indicator ?
Do you publish bulletins of new books—
    On a board in the Library ?
    Or in the newspapers ?
Have you any special rule for buying fiction ?
What is your annual circulation of books ?
How does circulation of fiction compare with total circulation ?
Do you permit readers to have access to the shelves ?
Do you approve of it ?
Is your library open on Sunday ?
Have you any special provision in your library—
    For children ?
    For school pupils ?
Have you any connection with the public schools ?
Have you any special collections of books ?
Do you keep scrap-books, for clippings, prints, etc. ?
Are there any fittings or other conveniences peculiar to your library ?

Outside the province of Ontario, there are at present not more than half a dozen free public libraries in the Dominion. These are at St. John, N.B., Chatham, N.B., Halifax, N.S., Winnipeg, Man., Victoria, B.C., Vancouver, B.C., and New Westminster, B.C. To these have been added two endowed free libraries, the Fraser Institute, Montreal, and the Portland Library, St. John, N.B.

Library	When est'd	Class	Income	Staff	Salaries	No. of Books	No. of Pamphlets	Catalogues	Classification	Circulation	Percentage of fiction [3]	Librarian or Secretary
Berlin	1884	Free	$1,822.82	1	$ 300.00	7,086	....	Printed	Educ. Dept	16,496	Very large	E. A. Schmidt
Brantford	1884	"	3,420.85	4	1,200.00	16,938	....	"	" "	66,715	80 %	E. D. Henwood
Brockville.	1891	"	1,308.36	3	325.00	9 5:0	....	Card and pr.	" "	40,660	50 %	Carrie R. Rowe
Collingwood	1856	"	897.59	1	200.00	5,000	....	Printed	" "	10.082	Large	F. B. Gregory
Dundas	1845	Public	838.00	1	250.00	7,396	....	"	" "	5,941	21 %	W. F. Moore
Elora	1871	"	300.00	1	75.00	8,000	....	"	11 Classes	7.000	55 %	H. Clarke
Guelph	1883	Free	1,722.22	2	600.00	10,418	....	"	Educ. Dept	59,666	48 %	Margaret Graham
Hamilton	1889	"	14,548.58	7	4,048.00	28,578	....	"	Dewey Syst	201,784	Very large	
Lindsay	1879	"	1,113.77	2	300.00	3,366	60	"	Chron. by subj	19,299	Two-thirds	E. A. Hardy
London	1895	"	10,836.94	4	2,300 00	14,767	....	Card and pr.	Dewey Syst.	81,122	"	R. J. Blackwell
Halifax	1865	"	......	5	1,450.00	23,250	...	Printed	" "	.....	50 %	J. Warren
Niagara	1848	Public	350.00	1	66.00	5,395	315	MSS. and pr.	Edud. Dept	15,980	50 %	Janet Carnochan
Paris	1841	"	600.00	1	170.00	6,800	....	MSS	" "	6,229	50 %	
Portland	1882	End'd	700.00	1	225.00	3,450	...	Printed	Alpha. by auts	10,595	...	Flor. Edwards
Montreal	1885	"	.....	4	....	39,000	....	Card	" "	.....	60 %	T. B. de Crèvecœur
St. John	1883	Public	2,000.00	2	675.00	12,000	....	"	Simple classn.	40,000	Two-thirds	Catherine Martin
St. Thomas	1884	"	1,971.12	1	360.00	7,293	....	Card and pr.	" "	21,511	20½ %	Eliza Morgan
Sarnia	1900	"	1,400.00	2	350.00	3,600	....	Printed	Educ. Dept	34,692	30 %	Jas. Spereman
Stratford	1847	Free	1,225.00	2	372.00	6,700	....	"	" "	40,600	60 %	J. D. Barnett
Toronto	1883	"	34,615.73	16	14,528.84	111,725	12,600	" "	Mod. Dewey [2]	539,226	60·1 %	Dr. Jas. Bain
Vancouver	1891	"	......	3 [1]	1,500.00	7,500	500	Printed	Special Classn.	40,000	85 %	Edwin Machin
Victoria	1867	"	......	2	840.00	8,000	300	"	Chron. by subj	.....	....	Henry Goward
Waterloo	1876	"	701.93	1	150.00	6,781	....	"	Educ. Dept	10,022	14 %	C. A. Hachull
Winnipeg	1879	" [5]	2,500.00	3	1,300.00	10,000 [4]	....	"	Am Lib. Cat	30,000	80 %	Geo. Bryce, LL.D., Chairman

---

[1] Exclusive of branches.

[2] Modified Dewey system in reference; Chronological in circulating department.

[3] "You cannot (writes Mr. Hardy, of the Lindsay library,) place any reliance on answers to this question, as the average Ontario library classifies fiction as History, Travels, Religion, Miscellaneous, etc."

[4] Of these 6,000 belong to the Historical Society of Manitoba.

[5] Governed by a joint committee appointed by the City Council and the Historical Society of Manitoba.

It will be seen from the foregoing table that the system of classification in most general use — if it may be dignified with the name of a system — is the one prescribed by the Education Department of Ontario. Several libraries use systems of their own, generally a simple alphabetical arrangement by authors under a few general headings. The Dewey Decimal System is used in the Hamilton Library, the Citizens' Free Library of Halifax, the London Public Library, and, in a modified form, in the Reference Department of the Toronto Public. It is also used in several Canadian college libraries. Cutter's Expansive System is used in only one Canadian library, that of McGill University.

The great majority of Canadian libraries use a printed catalogue, with periodical supplements. Card catalogues are used in the Fraser Institute, Montreal, in the Reference Department of the Toronto Library, and, in conjunction with a printed catalogue, at London, Brockville, St. Thomas, and in one or two other Ontario libraries.

The consensus of opinion among Canadian librarians and library committees seems to be somewhat divided on the question of permitting readers to have access to the shelves, under what is known as the Open Shelf, or Open Access, System. The system has been adopted, under various restrictions, in the following libraries: — Berlin (to all books except fiction and juvenile), Dundas (to a limited extent), Elora, Halifax (for reference purposes only), Hamilton (under certain restrictions), Niagara, Paris, Sarnia (not at present, but propose doing so in new library), Stratford (absolutely unrestricted, except as to fiction and juvenile), and Victoria. Vancouver replies: "The open access system was tried here and found very unsatisfactory." It might be added that in a large majority of the college libraries of Canada, students are permitted to have either full or partial access to the book shelves.

Another important point upon which information was obtained, is, whether any special provision is made for children, or school pupils. Here, again, opinion seems to be somewhat divided, although it may at once be said that, in the sense of the larger and fully organized children's departments of United States libraries, there is at present no such thing as special provision for children in Canadian libraries; that is to say, there are no rooms specially constructed and set apart for children, no fittings or furniture specially adapted to the needs of children, no library attendants whose special duty it is to look after the wants of the children, and, except to a very limited extent, no attempt to provide a special, carefully selected and classified, juvenile section in the library, with its own catalogues. The public library of Victoria provides "certain library shelves for children's books, to be selected but not read in the library"; Vancouver has "no special provision for children at present, but intends to do so in the new building now under construction through the generosity of Mr. Carnegie"; at St. Thomas "the Board has placed books in the schools for supplementary reading, under the teachers' supervision"; Berlin replies: "Not at present, but in our new building, which is being built this summer, a children's department will be included"; Lindsay has "a special collection of juvenile books, specially classified"; Brockville "would have special provision if we had proper accommodation"; Sarnia also pleads "lack of room"; St. John, N.B., has no special provision, but "aims at it"; Stratford "is arranging for a special children's reading-room in the new building."

So far, only one Canadian library has reached the stage where the establishment of branches becomes necessary or desirable. Toronto possesses five flourishing branches, in connection with the central reference and circulating library.

Indicators, generally a simplified form of the "Cotgreave," are used in the following libraries: Toronto, Hamilton, London, Berlin, Grand Trunk (Montreal), Brockville and Collingwood; Vancouver "intends to procure one," while St. John replies, "No, they are obsolete."

The Citizens' Free Library of Halifax is distinguished from all other Canadian libraries by possessing a bindery of its own, in which all necessary binding and repairing is done. The binder receives $34.66 per month, and an assistant gets $13.00 per month.

II.—*The Underground Railway.*

W. H. WITHROW, M.A., D.D.

(Read May 27, 1902.)

It is gratifying to Canadian patriotism to know that among the very first laws enacted by the newly organized province of Upper Canada was one for the abolition of slavery. In the year 1793 the conscript fathers of the new commonwealth, homespun clad farmers or merchants from the plough or store, with a large vision of the future, passed an act which forbade the further introduction of slaves and made provision for the gradual emancipation of all slave born children in the province. Dr. Scadding thus describes the picturesque surroundings of the scene:

"We see them adjourning to the open air from their straightened chamber at Navy Hall, and conducting the business of the young province under the shade of a spreading tree, introducing the English Code and Trial by Jury, decreeing roads, and prohibiting the spread of slavery; while a boulder of the drift, lifting itself up through the natural turf, serves as a desk for the recording clerk."[1]

From that time onward till the abolition of Slavery[2] in the American Republic, a period of nearly a hundred years, Canada was the place of refuge for many thousands of fugitives from bondage. The lone north star was the cynosure of their watching eyes. On many a midnight march it guided their footsteps till they reached our shores. It is estimated that more than 30,000 negro slaves found freedom in Canada. These were helped on their way to the land of liberty by a philanthropic organization known as the Underground Railway. Of this organization, of its methods, its results, and some of its principal agents, we purpose in this paper to give some account.

---

[1] Previous to this date, however, Lord Mansfield had declared, in 1772, "Villeinage has ceased in England, and it cannot be revived. The air of England," he said, "has long been too pure for a slave, and every man is free who breathes it. Every man who comes into England is entitled to the protection of English law, whatever oppression he may heretofore have suffered, and whatever may be the colour of his skin: Quamvis ille niger, quamvis tu candidus esses."

Cowper, the British poet of the slave, translated this dictum into verse that thrilled the age:—

"Slaves cannot breathe in England: if their lungs
Receive our air, that moment they are free;
They touch our country and their shackles fall."

Still earlier, in the very opening years of the eighteenth century, Chief Justice Holt had affirmed that "as soon as a negro comes into England he is free; one may be a villein in England, but not a slave"; and later: "In England there is no such thing as a slave, and a human being never was considered a chattel to be sold for a price."

[2] On September 22nd, 1862, President Lincoln announced that on the first day of January, 1863, "all persons held as slaves within any state or desig-

From the nature of the case the operations of the "Underground Railway" had to be conducted in secret. Few details of its work were placed on record. Its agents for very practical reasons "did good by stealth and blushed to find it fame." They lived in an atmosphere of suspicion and espionage. When discovered they were marked men, exposed to punishment by the law, and were subject to extra judicial disabilities, annoyance and persecution, and were sometimes done to death as martyrs of liberty. The literature of the subject is therefore meagre. It is scattered through reports of legal trials, newspaper and magazine articles and a number of books and sketches, reminiscence and biography. A few Underground Railway agents were indiscreet enough to commit to writing the record of their operations, some of which, for a time preserved, it was found necessary to destroy. Nevertheless, a number of works have been compiled on this subject.

The most considerable of these is Still's "Underground Railway Records," a large volume of 780 pages, which appeared in 1872 and a second edition in 1883. Mr. Still for some years before the war took an active part in the Pennsylvania Anti-Slavery Society, and had much personal intercourse with the fugitives whom he harboured and helped to Canada. Levi Coffin, an apostle of abolition, a distinguished member of an uncompromising anti-slavery family, has written a large volume of reminiscences of the stirring events in which he was so prominent. Theodore Parker, of Boston, an active abolitionist, made a large collection of manuscript and printed documents on this subject which is now in possession of the Boston Public Library.

That philanthropic Canadian, Dr. Alexander M. Ross, who bore a brave part in aiding the escape of fugitives, has in his "Recollection and Experiences of an Abolitionist," recorded many stirring

---

nated part of a state, the people whereof should then be in rebellion, should be then, thenceforward, and forever free." It was not, indeed, till June 23rd, 1864, that all laws for the rendition of slaves to their masters were repealed, and on January 31st, 1865, by a constitutional amendment, slavery was formally abolished throughout the entire Union, and the fourteenth amendment of the constitution absolutely forbade compensation being made either by th United States or by any state.

incidents of the anti-slavery campaign. The biographies of Fred Douglass, Josiah Henson, Austin Steward and other escaped slaves, also describe many personal incidents and adventures. A very vivacious volume entitled "Heroes in Homespun," by Ascot Hope (Robert Hope Moncrief), gives vivid pictures of the prolonged anti-slavery struggle. The investigations of Dr. Samuel G. Howe on the condition of the refugees in Canada after the Secession War were very painstaking and exhaustive, and his book on the subject gives much valuable information. Other memoirs, biographies, local histories and magazine and newspaper articles describe various aspects of the great moral crusade for the abolition of slavery and succour of the slave.

Mrs. Stowe's "Uncle Tom's Cabin" gives a graphic account of Underground Railway methods, and the Key to that work furnishes corroborative statements vindicating the general truthfulness of her novel — Levi Coffin, for instance, being faithfully portrayed under a pseudonym. Several of the anti-slavery poems by Whittier, Lowell and Longfellow catch their inspiration from the stirring episodes of this great movement.

The latest, best digested and most comprehensive book on this subject is "The Underground Railway from Slavery to Freedom," by Wilbur H. Siebert, Professor of European History in Ohio State University.[1] No other writer has so carefully investigated the sources of information, so admirably digested the vast multitude of facts he has discovered or presented them in such a luminous manner as Professor Siebert. To his volume and to those of several of the other writers referred to above we are indebted for much of the data of this paper. To this we add our own recollections of the antebellum period, our personal acquaintance with not a few fugitive slaves and our intensely interested observation of the struggle for the rendition of Robert Anderson, which was one of the *causes célèbres* of Canadian jurisprudence.

It is somewhat remarkable that such law-abiding and peace-loving people as the Friends or Quakers should be such active agents in the violation of law and defiance of authority involved in the abduction, concealment and forwarding to their destination of the hunted slaves. The zealous abolitionist and Underground Railroad agent, to use the words of Professor Albert Bushnell Hart, of Harvard University, argued thus: "In aiding fugitive slaves he was making the most effective protest against the continuance of slavery; but he was also doing something more tangible; he was helping the oppressed, he was eluding the oppressor; and at the same time he was enjoying the most romantic and exciting amusement open to men who had high moral standards. He was taking risks, defying the laws, and making himself liable to punishment, and yet could glow with the healthful pleasure of duty done. Above all," he adds, "the Underground Railroad was the opportunity for the bold and adventurous; it had the excitement of piracy, the secrecy of burglary, the daring of insurrection; to the pleasure of relieving the poor negro's sufferings it added the triumph of snapping one's fingers at the slave-catcher; it developed coolness, indifference to danger, and quickness of resource."

---

[1] Macmillan Company, New York, 1898. 8vo, pp. 478.

Fred Douglass, himself frequently exposed to fine and imprisonment for succouring the fugitives, writes: "I never did more congenial, attractive, fascinating and satisfactory work."

Professor Siebert has recorded the names of over three thousand persons who were engaged in this heroic work, a roll of honour in which its members might well be proud to be inscribed. While the rank and file were men of humble birth and unknown to fame, yet some of them were persons of high position, literary culture, or heroic daring — men who won "glorious infamy" by their sufferings for the slave. We may mention Colonel Thomas Wentworth Higginson, Theodore Parker, Gerrit Smith, Joshua Giddings, Levi Coffin, Dr. A. M. Ross and many others. The futile effort of Brown, of Osawatomie, to emancipate the slaves in Virginia led to his execution on the scaffold; but on many a weary march and by many a lonely camp fire, the armies of freedom chanted the Marseillaise of the Civil War: "John Brown's body lies amouldering in the grave, but his soul is marching on." Its refrain, too, furnished the motive for the noble battle hymn of the Republic.

"In the beauty of the lilies Christ was born across the sea,
With a glory in his bosom that transfigures you and me:
As he died to make men holy, let us die to make men free,
While God is marching on."

The historic record of the Quakers as unfaltering friends of liberty and uncompromising foes of oppression and wrong, as heroic confessors unto blood and martyrs unto death for righteousness and truth, finds further illustration in their connection with the Underground Railway.

From very early times in the history of slavery the bondman had a habit of seeking his liberty when he found an opportunity. It is a way that slaves always and everywhere have had. So great a loss thus accrued to the slave holders of the American Republic that as early as 1793, in an unconscious irony on its own recent struggle for Independence, Congress passed its first Fugitive Slave Law.

From that time down to the close of the Secession War may be considered the period of the secret modes of rescuing the slave, culminating in the well organized Underground Railway with its many routes and branches. The fugitive slave laws were from time to time made more severe in their penalties, involving not only heavy fines, but severe imprisonment. These laws became more and more obnoxious to the abolitionists as violations of primal human rights, of the instincts of liberty, and the principles of the Declaration of Independence. The benign provisions of the ancient Hebrew law of divine origin, "Thou shalt not deliver unto his master the servant which is escaped from his master unto thee," were cited as good reasons for violating the man-made law which virtually made all northern citizens accomplices in the crime of slave catching.

A considerable number of slaves in the far south escaped to Mexico or to the deep recesses of the Dismal Swamp, and some to Great Britain; but to most of them the true land of liberty was Canada. The stimulation of the increased scope and value given to slave labour by the Louisiana Purchase and the invention of the cotton gin and consequent vast extension of cotton culture made the task of the slave more bitter and increased his passion for liberty. Virginia, the mother of Presidents, became also the mother of slaves, as expressed in the pathetic poem of Whittier on the Virginia Slave-mother's Lament for her Daughters. The southern tier of slave states became a great mill in which were ground out the lives of bondmen; and new grist must be supplied, after the foreign slave trade had been abolished, by slave breeding in the northern tier of slave states. This stimulated the activity of the slave marts in Baltimore, Washington, Charleston, Richmond, New Orleans and St. Augustine. The dread of being "sold south," with the utter and irrevocable severance of the dearest and tenderest ties of kinship and love hung like a nightmare over the souls of myriads of our fellow-beings. The value of slaves became greatly enhanced and led to the systematic pursuit of fugitives and sometimes to the kidnapping of free negroes in the north:

Yet, in many parts of the far south the very existence of such a place as Canada and the succour which it proffered for the fugitive were unknown. The war of 1812-15, and the return of the southern soldiers to their homes, made that place of refuge known and predisposed the negroes to seek liberty among the enemies of their masters. It was not long before tidings from the fugitives in Canada found their way back to their old homes. Before the Secession War it is estimated that five hundred negroes annually travelled between the land of freedom and the land of slavery to rescue their kinsmen.

There were those also of an alien race, whose only kinship with the oppressed was that of the soul, who took part in this crusade. Notable among these was Dr. Alexander M. Ross, a native of Ontario, a cititzen of Toronto, a man of culture and of distinguished scientific attainments, who devoted his energies with impassioned zeal to the succour of the slave. Mrs. Stowe's tear-compelling story of "Uncle Tom's Cabin" was to him a revelation and a command. Upon reading it his resolution was taken, he says, to devote all his energies to let the oppressed go free. Dr. Ross was a naturalist of distinguished merit. He won name and fame in the old world and the new for his scientific studies, and received decorations from several European sovereigns. He visited the cotton states in pursuit of his studies in ornithology, visited many plantations, conversed with the more intelligent slaves and induced numbers to escape. He would give them money, food, a pocket compass, and a knife or pistol, and send them on to the land of liberty. A reward of $12,000 was offered for his arrest. While aiding the escape of a slave he evaded capture only by shooting the horse of his pursuer. He was a tried and trusted friend of John Brown whom he entertained at his home in Toronto.

Dr. Ross was in Richmond at the time of Brown's attack on Harper's Ferry. He was arrested and handcuffed, but escaped for lack of incriminating evidence. John Brown on the day before his death wrote to Dr. Ross exhorting him not to give up his labours for "the poor that cry and are in bonds."

During the Civil War Dr. Ross served in the Federal army and subsequently in the army of Mexico. He won the commendation of Mr. Gladstone for his zeal, forethought and tenacity, and for the signal courage and disinterestedness in humanity which formed the basis of his character.[1]

---

[1] Whittier made Dr. Ross the subject of the following memorial verses, which are printed in fac-simile in the *Canadian Magazine*, Vol. V., p. 16:

For his steadfast strength and courage
In a dark and evil time,
When the Golden Rule was treason,
And to feed the hungry crime.

For the poor slave's hope and refuge
When the hounds were on his track,
And saint and sinner, state and church,
Joined hands to send him back.

Blessings upon him! What he did
For each sad, suffering one,
Chained, hunted, scourged and bleeding,
Unto our Lord was done!

William Lloyd Garrison, one of the most famous of the abolitionists, was born in Newburyport, Mass., of New Brunswick parentage. In Baltimore and Washington he came in contact with slavery and wrote so vehemently against it that he was tried, imprisoned and amerced in a fine of $1,000. In 1831 he issued the first number of "The Liberator," in which, for five and thirty years, he continued to plead the cause of the slave. He adopted as his motto "My country is the world, my countrymen are all mankind," and stoutly affirmed "I will not equivocate, I will not excuse, I will not retreat a single inch, and I will be heard." These prophetic words are engraved upon his monument in the city of Boston, through whose streets he was dragged by a mob and committed to prison to save his life. When he visited England Sir Thomas Fowell Buxton was amazed to find him a white man, having taken it for granted that no one could plead so eloquently against slavery unless he had himself been a slave. He procured the aid of George Thompson, the eloquent English abolitionist, who earnestly pleaded the cause of the oppressed in the chief cities of the northern States and Canada.[1]

A noble band of women became leaders in the anti-slavery reform at a time when public opinion forbade public speaking to their sex. Mrs. Chapman, Mrs. Child, Lucretia Mott, Abby Kelley and others bravely bore this reproach and addressed public audiences when stones and brickbats crashed through the windows. For admitting free coloured girls to her school at Canterbury, Conn., Miss Prudence Crandall, a Quaker lady, was treated with contumely and malice. She was boycotted, to use the phrase of a later day, even by the doctor who refused to visit the sick in her school, and lived as in a besieged garrison. She was thrown into a prison cell from which a murderer had just been taken for execution. Her school was fired and well nigh wrecked and was finally closed by violence.

Wendell Phillips, a man of the bluest blood of Boston, a member of its Brahmin caste, son of the first mayor of that city, espoused the cause of the hated abolitionists. He shared their persecutions and witnessed their triumphs. Channing, Quincey and other heroes of reform soon joined the ranks.

Intense opposition was offered the new propaganda, anti-abolitionist riots took place in several northern cities. In New York the house of Mr. Louis Tappan was sacked and the furniture burned. In Philadelphia the anti-slavery hall was burned as was also an asylum for coloured children. The Hon. J. C. Burney, solicitor of Alabama, released his slaves, for which his name was stricken off the roll of the bar and the press he established at Cincinnati was destroyed.

---

[1] After thirty-five years' ceaseless effort the work to which "The Liberator" was devoted was accomplished, and Garrison, an invited guest, saw the flag of the emancipated Union raised upon the battlements of Fort Sumter.

Many ministers of religion obeyed the precepts and imitated the example of Him who came to "preach to the captives and to set at liberty them that are bruised."

The Rev. Elijah P. Lovejoy, a Presbyterian pastor, from Maine, for denouncing a cruel lynching in St. Louis, was driven from that city. The same fate followed him to Alton, Ill., where his house was attacked and he was himself shot to death by a mob. He was the first but not the last abolition martyr. His fate sounded the death knell of slavery. Soon more than a hundred anti-slavery societies sprang up throughout the north.

The Rev. Owen Lovejoy, whose brother, as we have seen, was murdered for the cause of liberty, was taunted as "nigger stealer." He replied, "Thou invisible demon of slavery, dost thou think to cross my humble threshold, and forbid me to give bread to the hungry and shelter to the houseless! I bid you defiance in the name of my God!"

For many years the light in the window of Thomas Rankin, a Presbyterian pastor on the Ohio River, "were hailed by slaves fleeing from the soil of Kentucky as beacons to guide them to a haven of safety."

Theodore Parker, the accomplished scholar and orator, and enthusiastic abolitionist of Boston, writes: "I must attend to living men, and not to dead books, and all this winter my time has been occupied with these poor souls."

The Rev. Charles Torrey in 1838 resigned the pastorate of a Congregational church in Providence, Rhode Island, and relinquished quiet and comfort that he might devote himself to the work of freeing the slaves. He was thrust into prison, attempted to escape, was sentenced to penitentiary for six years and in prison he died. In 1844 he wrote: "If I am a guilty man, I am a very guilty one; for I have aided nearly four hundred slaves to escape to freedom, the greater part of whom would probably, but for my exertions, have died in slavery." He was buried in Mount Auburn Cemetery, Cambridge, Mass., and a memorial service in Faneuil Hall on the day of his funeral was signalized by a poem by Lowell, and addresses by General Fessenden and Walter Channing. Of him, Whittier wrote: "In the wild woods of Canada, around many a happy fireside and holy family altar, his name is on the lips of God's poor. He put his soul in their soul's stead; he gave his life for those who had no claim on his love save that of human brotherhood."

Calvin Fairbank, a student of Oberlin College, read at his father's fireside, a station of the Underground Railway, the story of sorrow of escaped slaves. "My heart wept," he writes, "my anger was kindled, an antagonism to slavery was fixed upon me." He devoted himself with enthusiasm to the work of succouring the slave and soon was placed behind prison bars. He was arrested again and again and spent seventeen years and four months of his life in prison for abducting slaves, and has placed on record the statement that he received at the hands of prison officials 35,000 stripes on his naked body. His ample reward was that he had guided forty-seven slaves toward the north star. "I piloted them," he writes, "through the forests, mostly by night; girls, fair and white, dressed as ladies; men and boys, as gentlemen or servants; men in women's clothes, and women in men's clothes; boys dressed as girls, and girls as boys; on foot or on horseback, in buggies, carriages, common wagons, in and under loads of hay, straw, old furniture, boxes and bags; crossing the Jordan of the slave, swimming or wading chin deep; or in boats, or skiffs; on rafts, and often on a pine log. And I never suffered one to be recaptured."

Two of the most noted leaders of the Underground Railway movement were those sturdy Quakers, Thomas Garrett of Delaware, and Levi Coffin of Ohio. In his sixtieth year Garrett, when mulcted in a fine of $8,000 for the crime of helping his brother man, replied: "Judge, thou hast not left me a dollar, but I wish to say to thee, and to all in this court-room, that if any one knows of a fugitive who wants shelter and a friend, send him to Thomas Garrett and he will befriend him." Long afterwards he said: "The war came a little too soon for my business. I wanted to help off three thousand slaves. I had only got up to twenty-seven hundred."

Levi Coffin, the Quaker Greatheart of Mrs. Stowe's "Uncle Tom's Cabin," was born in a slave state, North Carolina, in 1798. The scenes he witnessed as a boy entered his soul. In 1847 he settled in Cincinnati for the purpose of dealing only in the product of free labour. It is said that "for thirty-three years he received into his house more than one hundred slaves every year." Under Levi Coffin's Quaker drab and broad-brimmed hat there lurked a vein of quaint humour combined with a shrewd business method. Summoned before the Grand Jury, he was asked if he knew of any violation of the fugitive slave law in his own neighbourhood. He replied that persons often stopped at his house who *said* they were slaves, but he knew nothing about it from their statements for the law did not consider them capable of giving evidence. He collected money for a poor family in need, and three swaggering Kentucky slave holders subscribed their dollar each and were greatly disgusted to find they had helped fugitive slaves along the Underground Railway. He so worked upon the sympathies of a strongly pro-slavery man by showing him a scarred and wounded fugitive that he could not help contributing to his relief. Coffin promptly rejoined: "Thou hast laid thyself liable not only to a heavy fine, but to imprisonment, under the Fugitive Slave Law. Thou gave a fugitive slave a dollar to help him to Canada; I saw thee do it!"

Sometimes he induced free negroes to act the part of supposed runaways. They would be hurriedly driven off with ostentatious precautions, to cover the fact that the real fugitives had quietly escaped. Coffin's good wife so far compromised with her conscience as to lay aside her Quaker garb and dress up as a fashionable lady, with a negro fugitive slave carrying a rag baby behind her. Coffin knew every quirk of the law and was remarkably shrewd in taking advantage of any flaw in its process to extricate the fugitives from its grasp.

At the close of the War, after the emancipation of the slaves in the United States, Coffin declared: "The stock of the Underground Railroad had gone down in the market, the business is spoiled, the road is now of no further use." The work of the Underground Railroad was done.

It was through Coffin that this mysterious railway received its designation. "Certain baffled slave-hunters," says "Ascot Hope," "are said to have declared that there must be an underground railroad to Canada, with Levi Coffin for president, as they never could get the slightest trace of a fugitive after reaching his house, so shrewdly and slyly did the Quaker manage their flight." Analogous to this was the "grape-vine telegraph" by which intelligence was secretly conveyed with strange rapidity along the Underground Railway lines.

A friend, and in a way a colleague of Coffin's, was John Fairfield, a man of dauntless spirit and reckless audacity. He was the son of a Virginia planter, and became a fierce antagonist of the slave system amid which he was brought up. He was arrested again and again, but always managed to break gaol. He used to hector and bully the very men whom he was helping to escape in a way that convinced their owners that he had little sympathy with abolitionists. Bringing off a number of mulattoes and quadroons, he provided himself at Philadelphia with $80.00 worth of wigs and powder for their disguise. In 1853 he brought off twenty-eight slaves at the same time. At Detroit, writes Mr. Fitch Reed, "two hundred and fifty abolitionists took breakfast with them just before daylight. We procured boats enough for Fairfield and his crew. As they pushed off from shore, they all commenced singing the song: 'I am on my way to Canada, where coloured men are free,' and continued firing off their arms till out of hearing."

On witnessing the ecstasies of the negroes on reaching the land of liberty, some of them to meet long lost kinsfolk or friends, Fairfield exclaimed: "This pays me for all dangers I have faced in bringing this company, just to see these friends meet."

He was once pursued to Pittsburg by a special train, but the fugitives under his convoy made a dash from the cars, scattered through the city and were so well concealed that not one could be caught, and Fairfield, their gallant conductor, conveyed them all to Canada. After many bold exploits he mysteriously disappeared. "Levi Coffin," says "Ascot Hope," "is inclined to identify him with an unknown white man killed in stirring up an insurrection among slaves, shortly before the war. A slight chance of fortune might have made his name ring through the world as loudly as that of John Brown."

One of the boldest exploits of John Brown was his escorting, in 1858, a band of twelve slaves from Missouri by a devious route of well nigh 1,000 miles to Windsor, in Canada, in mid-winter, in spite of a reward of $3,000 for his arrest. This raid excited great alarm in Missouri. Many slaves, as a consequence, were sold south and others escaped. John Brown's policy, he himself avowed, was to destroy the money value of slave property by rendering it insecure.

Captain Jonathan Walker, for the crime of attempting to convey seven slaves from Pensacola to the Bahamas, was branded on the hand with the letters "S. S.", slave stealer, amerced in a heavy fine and languished for nearly four years in a southern prison. Whittier's stirring poem immortalizes his heroism:

> "Why, that brand is highest honour! — than its traces never yet
> Upon old armorial hatchments was a prouder blazon set:
> And thy unborn generations, as they tread our rocky strand,
> Shall tell with pride the story of their father's branded hand!
>
> "Then lift that manly right-hand, bold ploughman of the wave!
> Its branded palm shall prophesy, 'Salvation to the slave!'
> Hold up its fire-wrought language, that whoso reads may feel
> His heart swell strong within him, his sinews change to steel."

A bold attempt was made by Captain Drayton, of the schooner Pearl, to convey seventy-six slaves at one time from the city of Washington.[1] By an irony of fate their dash for liberty was made during a great torchlight procession in honour of the establishment of the Republic in France. They were pursued and brought back. Three persons were prosecuted, the amount of their bail being fixed at

---

[1] Outgoing vessels were sometimes smoked, as is done to get rid of rats, to make sure that no stowaways were on board.

$228,000. Drayton was himself fined $10,000 and sent to prison in default, but through the efforts of Senator Sumner, after four years' imprisonment, was pardoned. The affair caused intense excitement in Congress.

Undeterred by such disasters, Richard Dillingham, a Quaker, for aiding a slave to escape, was condemned to three years' imprisonment in the Nashville penitentiary; but, separated from his aged parents and his betrothed bride, he died in two months in the prison, from an epidemic of cholera.

A year after Dillingham's death, William M. Chaplin, for attempting the release of two negroes, the property of Robert Timms and Alexander H. Stevens, was arrested, but was released on bail bonds of $20,000. After five months' imprisonment, by consent of his bondmen he sacrificed his bail rather than meet the trial, which would have resulted in a fifteen years' imprisonment.

Peter Still escaped from Alabama after forty years of slavery. It was too perilous a task for him to return for his family through 1,600 miles of danger and difficulty. Seth Concklin, a white man, volunteered to do it. "He travelled," says "Ascot Hope," "from first to last some thousands of miles, and spent two or three months among men who might have hung him up to the nearest tree had they guessed his true business." Seth Concklin convoyed his party as far as Vincennes. He was arrested and escaped, but was "found drowned with his hands and feet in fetters and his skull fractured"—perhaps by accident, perhaps by a darker fate.

Two brothers, market-gardeners, living near Baltimore, concealed in a large box a slave woman and her daughter and conveyed it in their market wagon across Maryland and Pennsylvania, a three weeks' journey, to the land of liberty. Two students of Marion College were sentenced to twelve years' imprisonment for assisting two negroes to escape, and a pro-slavery party burned the college to the ground.

Among the most heroic agents of the Underground Railway were the negroes themselves. Many of these, having tasted the sweets of liberty in Canada, voluntarily incurred the risks of recapture, with the fearful penalties consequent thereon, in their endeavour to bring off their kinsfolk and often those whose only kinship was that of race and misfortune. Professor Redpath considers as many as 500 a year as incurring this risk.

No danger was too great for these knights of Christian chivalry to incur. With a reward for their capture, dead or alive, they braved imminent peril again and again.

One of the most notable of these sable heroes was Josiah Henson, the original of Mrs. Stowe's "Uncle Tom." Born and bred a slave, he at length escaped to Canada. Eager to lead others into liberty, he travelled on foot 400 miles into Kentucky, and brought off safely a party of thirty fugitives. Time after time he repeated his adventurous journey and rescued in all 118 slaves from bondage. Of one of these journeys he writes: "Words cannot describe the feelings experienced by my companions as they neared the shore; their bosoms were swelling with inexpressible joy as they mounted the seats of the boat, ready eagerly to spring forward that they might touch the soil of the freeman, and when they reached the shore they danced and wept for joy, and kissed the earth on which they first stepped, no longer the *Slave*, but the *Free*."

John Mason, another fugitive slave from Kentucky, aided the escape in nineteen months of two hundred and sixty-five fugitives, and in all assisted not less than 1,300 to escape to Canada. He was finally captured by the aid of bloodhounds. He resisted till both arms were broken. He was sold south to New Orleans, but escaped to the city of Hamilton, in Canada. "Let a man walk abroad on Freedom's Sunny Plains," he writes, "and having once drunk of its celestial 'stream whereof maketh glad the city of our God,' afterward reduce this man to slavery, it is next to an impossibility to retain him in slavery."

A brave woman named Armstrong, disguised as a man, returned to the Kentucky plantation, where she had been a slave, hid near a spring where her children came for water, and brought off five of them to Canada.

Surpassed by none in high courage and consecrated zeal in these efforts to emancipate the slave was the humble heroine Harriet Tubman. Of this simple black woman Governor William H. Seward, of New York, wrote: "I have known Harriet long, and a nobler, higher spirit or a truer, seldom dwells in human form." John Brown described her as "one of the bravest persons on this continent — General Tubman, as we call her." "She saw in the oppression of her race," says Siebert, "the sufferings of the enslaved Israelites, and was not slow to demand that the Pharaoh of the South should let her people go." She, therefore, received the name of Moses — from the great Hebrew liberator who led to freedom a nation of slaves. Herself born a slave, she first tasted the sweets of liberty in 1849. She subsequently made nineteen excursions south and brought off over three hundred fugitives from bondage. All her own earnings were devoted to this mission together with generous sums given her. Her method was, having secured her convoy of slaves, to start north on Saturday night so as to allow a good start before they could be advertised, and to pay negroes to tear down the advertisements of their escape.[1] She would soothe the crying babies with paregoric and carry them in baskets. When hard pressed she would make a detour southward to throw off pursuit. At one time an award of as much as $12,000 was offered for her arrest; yet, unafraid, she pursued her self-imposed task. She boldly waded through icy waters in mid-March, lay hidden in forest or swamp, and incurred incredible hardships.

She brought off in a rude home-made chaise her aged parents. unable themselves to walk, and several brothers and sisters. She was something of a mystic and felt conscious communion with the unseen. She had no fear of arrest for she ventured only where God sent her. She expressed her heroic faith and confidence in the words: "Jes so long as God wanted to use me he would take keer of me, an' when he didn't want me no longer, I was ready to go. I always tole him, I'm gwine to hole stiddy on to you, an' you've got to see me trou." Of her Thomas Garrett said: "I never met with any person, of any colour, who had more confidence in the voice of God, as spoken to her soul."

During the Civil War she was employed as an hospital nurse and scout. "She made many a raid," says Governor Andrew, of Massachusetts, "inside the enemies' lines, displaying remarkable courage, zeal and fidelity."

Old, infirm and poor she still lives in a humble home in Auburn, N.Y., which she transformed into a hospital where she cared for the helpless of her own race.

It should be to every Canadian ground for patriotic pride that during all the years of struggle for the abolition of slavery the only refuge on this continent for the fugitives from bondage was beneath our red cross flag of freedom. The land of promise in the north exercised such a fascination for the slave that their owners endeavoured to discount its attractions by absurd stories concerning its vast distance, the wintry rigours of its climate, the sterility of its soil, its perils from savage beasts and more savage men. One fugitive declares he was assured that the Detroit River was over three thousand miles wide, and a ship starting out in the night would find herself in the morning "right whar she started from." Another was told the grotesque story "that in Canada the British would put out their eyes and send them to lifelong labour in mines underground."

---

[1] These advertisements of runaway slaves are evidence of the cruelties with which they were sometimes treated. They describe the scars upon their bodies; the lacerations of whips; the branding with hot iron on the back, or hand, or cheek; the wounds of rifle shots; the scars by the teeth of bloodhounds with which they had been pursued, and of the fetters with which they were manacled; and sometimes they escaped with iron bands on neck or ankle. Sometimes one or two teeth were knocked out or a slit made in the ear as marks by which slaves could be readily identified. See Reports of Trial of John Anderson, a fugitive slave, at Toronto, 1860, for alleged crime of murder in Missouri.

But the slaves were too shrewd to be deceived by these calumnies. "The rumour gradually spread," says Professor Siebert, "among the slaves of the Southern States, that there was, far away under the north star, a land where the flag of the Union did not float; where the law declared all men free and equal; where the people respected the law, and the government, if need be, enforced it. The rumour widened; the fugitives so increased, that a secret pathway, afterward called the Underground Railroad, was soon formed, which ran by the huts of the blacks in the slave states, and the houses of the good Samaritans in the free states. Before the year 1817 it is said that a single group of abolitionists in southern Ohio had forwarded to Canada by this secret path more than a thousand fugitive slaves."

Henry Clay, Secretary of State in 1828, described the escape of slaves as a growing evil which menaced the peaceful relations between the United States and Canada, and urged an extradition treaty for their return; but the British Government staunchly and steadily refused to depart from the principle that every man is free who reaches British ground.

The Underground Railway came in time to cover with a network of routes, not found in the railway maps, the territory embraced by the middle and northern states from the Mississippi to the Atlantic. The greater number, however, were in Ohio, Pennsylvania, New York and other states contiguous to the frontier of central Canada. Windsor, Sandwich, Amherstburgh, Owen Sound, Collingwood, Sarnia, and the Niagara frontier were the principal points of entry for this contraband commerce. "The untrodden wilds of Canada, as well as her populous places, seemed hospitable to a people for whom the hardships of the new life were fully compensated by the consciousness of their possession of the rights of freedom, rights vouchsafed them by a government that exemplified the proud boast of the poet Cowper:—

'Slaves cannot breathe in England; if their lungs
Receive our air, that moment they are free!
They touch our country and their shackles fall.'"

The chief agents of the Underground Railway were found, as we have said, among the quiet and peace-loving Quakers. The members of the Presbyterian and Wesleyan Methodist churches, which were strongly anti-slavery in their sympathies, were very good seconds in this law-breaking practical Christianity.

After the passage of the Fugitive Slave Law of 1850, Philadelphia and New York became important *entrepôts* for receiving and forwarding fugitive slaves. These arrived both by rail and coastwise vessels and were sent by way of Albany, Syracuse and Rochester, or by Harrisburg and Elmira to Upper Canada. A few escaped by way of New England, but the chief routes were through Ohio and western Pennsylvania. Cleveland, Sandusky, Toledo, Detroit and other border towns became important stations of the Underground Railway.

The abolitionists and the helpers of the slaves were not sustained by public sympathy or applause. They were under ban and social disabilities, the subjects of insult and injury. "Niggerites," and "amalgamationists" were among the epithets hurled at them, and "nigger-thief" was the inappropriate designation given men who restored the negro to his ownership of himself. They were subject to suspicion, espionage and persecution; their cattle were injured; their persons were menaced; their houses in some cases were burned. Professor Siebert quotes the offers of as much as $2,500 for the abduction or assassination of the Rev. John S. Mahon, of Brown County, Ohio, for his offence in aiding the escape of slaves. The slave hunter took the law in his own hands. One such assaulted and injured for life a free citizen and was amerced in a fine of $10,000 for his crime. A Kentucky slave holder assumed Quaker garb to worm out the secrets of the Friends, but he could not quite adopt their phraseology, and was detected as a wolf in sheep's clothing.

From the need of secrecy most of the travel was done by night, and also because many of the slaves had no other guide but the north star.[1] Professor Siebert thus dramatically described the process at a station of the Underground Railway: "The faltering step, and the light, uncertain rapping of the fugitive at the door, was quickly recognized by the family within, and the stranger was admitted with a welcome at once sincere and subdued. There was a suppressed stir in the house while the fire was building and food preparing; and after the hunger and chill of the wayfarer had been dispelled, he was provided with a bed in some out-of-the-way part of the house, or under the hay in the barn loft, according to the degree of danger. Often a household was awakened to find a company of five or more negroes at the door. The arrival of such a company was sometimes announced beforehand by special messenger."

---

[1] Readers of Lowell's "Biglow Papers" will remember how Birdofredum Sawin undertook to capture a slave "runnin'." But Pomp captured him and made him work all spring. This is Birdofredum's account of it :

> "He made me larn him readin', tu, (although the critter saw
> How much it hut my morril sense to act agin the law),
> So'st he could read a Bible he'd gut; an' axed ef I could pint
> The North Star out; but there I put his nose some out o' jint,
> For I wheeled roun' about sou'west, an', lookin' up a bit,
> Picked out a middlin' shiny one an' tole him thet wuz it."

Special passwords, signals and cryptic signs were employed; the imitated hoot of an owl or cry of a bird was used. A vein of humour ran through some of the secret messages, as in the following:

"By to-morrow evening's mail you will receive two volumes of the 'irrepressible conflict,' bound in black. After perusal, please forward, and oblige."

"Uncle Tom says if the roads are not too bad you can look for those fleeces of wool by to-morrow. Send them on to test the market and price, no back charges."

Others, with more courage than prudence, boldly wrote without concealment, as the following quoted by Siebert:

"I understand you are a friend to the poor and are willing to obey the heavenly mandate, 'Hide the outcasts, betray not him that wandereth.'

"Yours in behalf of the millions of poor, opprest and downtrodden in our land."

One good Quaker in Ohio had a large covered wagon for conveying fugitives, which he named "The Liberator." Others used pedler's wagons with concealed recesses. Some fugitives were shipped as freight in boxes. One man, appropriately named Box Jones, was sent in a packing case from Baltimore to Philadelphia, and was seventeen hours on the way. A ruse of Levi Coffin's was to forward twenty-eight negroes in broad day in a funeral-like procession. The routes often followed zigzag detours in order to throw off pursuit and secure safe hiding.

The fugitives were concealed in barns, in hayricks, in cellars and sub-cellars, in the heart of a wood-pile, in the abutment of a bridge, in a smoke-house, in a rail pen covered with straw, in thick, dark woods, in a coal bank, in a cave, beneath a trap door. One good pastor hid the fugitives three days in the belfry of his church, another built a room with a secret panel.

For disguises the men sometimes carried scythes or rakes as if seeking work. Light mulattoes sometimes were passed as white men; sometimes they were disguised by blacking the hands and face. Sometimes theatrical outfits of wig and beard and clothing were employed. A mulatto girl was dressed in silks and ribbons and furnished with a white baby borrowed for the occasion. To her chagrin her master was on the train by which she travelled and watched the ferry for her at

Detroit. When the steamer was under way the fugitive removed her veil and gave a farewell greeting to her master, whose turn it now was to be chagrined. The Quaker veiled bonnet and shawl were admirable disguises, and Brother Aminabab or Jonathan tenderly convoyed on his arm a feeble and decrepit companion, who soon proved to be a very alert negress. A young slave mother with her two children were placed under the convoy of an ardent pro-slavery man, who little thought, so fair was their complexion, that he was acting as an agent of the Underground Railway.

A black nurse, brought with her mistress to Connecticut, refused to take advantage of being in a free state. "Don't you wish to be free?" she was asked. With impressive earnestness, she replied, "Was there ever a slave that did not wish to be free? I long for liberty. I will get out of slavery if I can, the day after I have returned; but go back I must, because I promised that I would."

As may well be supposed, considerable amounts of money were needed to meet the wants and travelling expenses of these fugitives, who after years of toil owned not a penny, nor even themselves. Yet these needs were always met, humble donors giving lavishly to help the escaped slaves.

The "conductors" of this railway ran no small risk. Vigilance committees were organized to guard the route, aid the slave and prevent pursuit. Theodore Parker writes: "Money, time, wariness, devotedness for months and years, that cannot be computed, and will never be recorded except, perhaps, in connection with cases whose details had peculiar interest, were nobly rendered by the true anti-slavery men."

They were known even to storm the Court House where a fugitive was confined and rescue the prisoner, not to lynch but to save him. John Brown, the hero of Harper's Ferry, organized in Springfield, Mass., a league of "Gileadites" to resist the enforcement of the fugitive slave law,—"Whosoever is fearful or afraid let him return and depart early from Mount Gilead." Brown urged bold measures, the carrying of weapons, the rescue of the prisoners, the creating a tumult in court by burning gunpowder in paper packages and similar practices. "Stand by one another while a drop of blood remains," he said, "and be hanged if you must, but tell no tales."

The fugitives were often penniless, naked and hungry. Sometimes they came "in droves." Levi Coffin had seventeen fugitives at his table at one time. Companies of twenty-eight or thirty were not unknown. They needed food, clothing and money to help them on their way. Although it was forbidden by law under heavy penalties to give the slightest assistance, yet the friends of the slaves did not hesitate to violate such unrighteous commands. Emergency funds were established whose contributors were described as "stockholders" in the Underground Railway. Women conducted sewing circles to supply the fugitives with clothes. Even humble negroes, both men and women, gave freely to help them. After the introduction of steam locomotion, railways and steamboats could often be used. The cost of tickets was considerable, yet it was always cheerfully met by sympathetic friends. Generous captains on the Mississippi, Ohio and Illinois rivers often conveyed fugitives as stowaways. Captain William Brown in 1842 conveyed in seven months sixty-nine of them across Lake Erie to Canada. Scows and sailing craft were also employed.

It is remarkable that so seldom were runaways returned to slavery, and that not unfrequently those seized for that purpose were rescued from the slave hunters. Even when on trial and under the very eyes of the judge, they were sometimes smuggled out of the court room, and the marshal and his deputies hustled and prevented re-arresting them.

Many of the friends of the fugitives suffered in their person and in their purse for their humanity. In Michigan three persons were mulcted in fines and costs $6,000. D. Kauffman, in Pennsylvania, for sheltering a family of slaves in his barn, was fined over $4,000. For a similar offence R. Sloan, a lawyer of Sandusky, was fined $3,000. Space would fail to do justice to this noble army of heroes, and some of them martyrs. Professor Siebert gives a list of 3,211. Their obscurity and unknown death have prevented the record of many more. He well remarks: "Considering the kind of labour performed and the danger involved, one is impressed with the unselfish devotion to principle of these emancipators. There was for them, of course, no outward honour, no material recompense, but instead such contumely and seeming disgrace as can now be scarcely comprehended."

Five families in Ohio whom he mentions forwarded over a thousand fugitives to Canada before the year 1817. Daniel Gibbons, of Pennsylvania, in fifty-six years, aided about one thousand, Dr. Nathan M. Thomas, of Michigan, fifteen hundred, and John Fairfield not only hundreds, but thousands. General McIntyre, resident in Ohio, aided over a hundred fugitive slaves. "Of the multitudes," says ex-President Fairchild, "that came to Obelin, not one was ever taken back to bondage." So intense was popular sympathy with the anti-slavery movement, that a sign-post was erected in the form of a fugitive running towards the town. In consequence of this defiance of the law against harbouring slaves, repeated attempts were made to repeal the charter of Oberlin College.

Though the heroes of this great crusade concealed their acts, they did not conceal their principles; indeed, they sought to make converts to their convictions. They opposed to the slave law the moral dictates of the Golden Rule, of God's ancient oracles, and the sacred teachings of the Declaration of Independence. "They refused," says Siebert, "to observe a law that made it a felony in their opinion to give a cup of cold water to famishing men and women fleeing from servitude."

Like every great moral movement, their sacred passion found expression in sacred song, of which the following breathes the spirit:

"'Tis the law of God in the human soul,
'Tis the law in the Word Divine;
It shall live while the earth in its course shall roll,
It shall live in this soul of mine.
Let the law of the land forge its bonds of wrong,
I shall help when the self-freed crave;
For the law in my soul, bright, beaming, and strong,
Bids me succour the fleeing slave."

Theodore Parker, in a sermon in Boston, thus defied the Fugitive Slave Bill of 1850: "To law framed of such iniquity I owe no allegiance. Humanity, Christianity, manhood revolts against it. For myself, I say it solemnly, I will shelter, I will help, and I will defend the fugitive with all my humble means and power."

The discipline of the Methodist Church as early as 1789 prohibited the slave trade: "the buying or selling the bodies or souls of men, women, or children, with an intention to enslave them;" and the great division of the Methodist Church in America arose from the possession of slaves by Bishop Jehu Andrews of its southern section.

The Fugitive Slave Bill of 1850, intended to prevent the escape of slaves, increased it. Slaves dissembled their desire for freedom for fear of being sold south. "No, I don't want to go to none o' your free countries," said one. "But I surely *did,*" he added, in telling the story in Canada; "a coloured man tells the truth *here,* there he is afraid to."

In the employment of the writer's father as stableman was an escaped slave. He used diligently to con his spelling-book during off hours, and so learned to read. "Did they use you well, Sam, in your old Kentucky home?" we said one day. "Yes, boss," he replied, "dey use me mighty well; allus had 'nuff to eat, not over hard work; but den I'se *free* here," and his black face lit up and his form straightened with the conscious dignity of manhood.

The demonstrations of delight of the fugitive slaves on their reaching the frontier of Canada were often pathetic, even when they were grotesque. Says Captain Cleveland of two negroes whom he landed on our shores: "'Is this Canada?' they asked. 'Yes,' I said, 'there are no slaves here;' then I witnessed a scene I shall never forget. They seemed to be transformed; a new light shone in their eyes, their tongues were loosed, they laughed and cried, prayed and sang praises, fell upon the ground and kissed it, hugged and kissed each other, crying, 'Bress de Lord! Oh! I'se free before I die.'"

In their ecstasies they sometimes lay down and wallowed in the sand.

As Harriet Tubman was convoying a party of fugitives over the Suspension Bridge, she wished them to see the great cataract of which it commands so magnificent a view. "'Joe, come, look at de Falls! it's your last chance.' But Joe sat still and never raised his head. At length Harriet knew by the rise in the centre of the bridge and the descent on the other side that they had crossed the line. She sprang across to Joe's seat, shook him with all her might, and shouted, 'Joe, you've shook de lion's paw!' Joe did not know what she meant. 'Joe, you're free!' Then the strong man, who could stand under his master's whip without a groan, burst into an hysterical passion of weeping and singing, so that his fellow-passengers might think he had gone crazy; but did not withhold their sympathy when they knew the cause of such emotion."

Not a few slaves purchased their own liberty by working overtime, and others were purchased by white sympathizers for the purpose of emancipation when they could not be otherwise rescued.

Sometimes an attempt was made to kidnap fugitive slaves even on Canadian soil. A negro named Stanford and his wife had escaped from slavery to St. Catharines, in Canada. A professional slave hunter, Bacon Tate by name, in 1836 kidnapped and carried off these fugitives to the city of Buffalo. He broke into Stanford's house, dragged him, his wife and six week's old baby out of bed, and forced them into a carriage, and before daylight had crossed the Niagara River. The slave hunters were followed by some black neighbours of Stanford's. At Buffalo a coloured rescue party dragged the fugitives from the carriage in which they were being abducted, defended them for a time in a private house, hurried them to the ferry despite the Riot Act read by the sheriff, and after a running fight of two hours the Stanfords were placed in the ferry boat. "Those left behind," says 'Ascot Hope.' "gave three cheers, eagerly watching the boat as it bore the poor slaves out of reach of their enemies. When it was seen to reach the Canadian side, Stanford leaped on shore, rolled himself in the sand, and even rubbed it into his hair, in the wildness of his delight at finding himself once more on free soil." Twenty-five of the rescue party were tried and fined, but no punishment was meted out to Tate for his dastardly crime.

The hardships which many of the refugees underwent in Canada were severe. One of them, writing from Hamilton, Canada West, to Fred. Douglass, said: "Twenty-one years ago I stood on this spot, penniless, ragged, lonely, homeless, helpless, hungry and forlorn. .. . . Hamilton was a cold wilderness for the fugitive when I came there."

There were at first no schools, no churches and very little preaching and other consolations of religion to which the negroes had been accustomed. Their poverty, their ignorance, their fears, made their condition very pitiable. "Yet," says Siebert, "it was brightened much by the compassionate interest of the Canadian people, who were so tolerant as to admit them to a share in the equal rights that could at that time be found in America only in the territory of a monarchical government."

Generous efforts were soon made to meet their religious needs. As early as 1838 a mission was begun among them. Schools were established and other means adopted for the betterment of their social condition. A manual labour institute was begun at Amherstburgh. They were visited by anti-slavery friends from the United States, John Brown, Levi Coffin and others. Mr. Coffin, describing their condition, said some of these former slaves "owned good farms, and were perhaps worth more than their former masters. . . . Many fugitives arrived weary and footsore, with their clothing in rags, having been torn by briers and bitten by dogs on their way, and when the precious boon of freedom was obtained, they found themselves possessed of little else, in a country unknown to them and a climate much colder than that to which they were accustomed." Yet they soon earned an honest living, and not a few amassed considerable property.

Mr. Clay remonstrated with the British Government for harbouring these refugees: "They are generally," he alleged, "the most worthless of their class, and far, therefore, from being an acquisition which the British Government can be anxious to make. The sooner, we should think, they are gotten rid of the better for Canada." "But," says Professor Siebert, "the Canadians did not at any time adopt this view." The Government gave the exiles welcome and protection and land on easy terms. Under the benign influence of Lord Elgin, then Governor-General, the Elgin Association was formed for the purpose of settling the refugees on Clergy Reserve and Crown lands in the township of Raleigh. In the so-called Queen's Bush, a vast region stretching towards Lake Huron, many fugitives hewed out for themselves homes in the wilderness. At Dawn, near Dresden, as early as 1842, a negro settlement was formed. The Revs. Hiram Wilson and Josiah Henson organized a training institute. Several hundred acres of land were secured on which in ten years there were five hundred settlers, with sixty pupils in the school. In other settlements adjacent, says Mr. Henson, there were between three and four thousand refugees and the pupils reached the number of one hundred and sixteen. Thus was anticipated by nearly half a century the industrial training which Booker T. Washington has so successfully organized at Tuskegee, Alabama.

At Buxton, in Kent County, a settlement named after Thomas Fowell Buxton, the famous philanthropist, was organized, and in 1848 the Elgin Association was incorporated. Ten years later Dr. Howe reports 2,000 acres deeded to negro owners, and two hundred neat cottages erected, with a population of about 1,000. "There is no tavern, and no groggery," he writes, "but there is a chapel and a schoolhouse. . . . Most interesting of all are the inhabitants. Twenty years ago most of them were slaves, who owned nothing, not even their children. Now they own themselves; they own their houses and farms; and they have their wives and children about them. They are enfranchised citizens of a government which protects their rights." A saloon was opened in the Buxton settlement, but could not find customers enough to support it, and so was closed within a year.

Other similar but less noted colonies, one bearing the honoured name of the philanthropist Wilberforce, were established. Some of the negroes' best friends, however, considered that they would succeed better if thrown upon their own resources and encouraged to cultivate self-reliance. Their gregarious instinct, however, tended to keep them together. The refugees for the most part gravitated towards the towns and cities—Amherstburgh, Windsor, Chatham, St. Catharines, Hamilton and Toronto—where they cultivated small gardens and performed such lowly labours as wood sawing, whitewashing, hotel service, laundry work and the like. A less number found homes and occupations at Kingston and Montreal, and a few at St. John and Halifax.

The negroes at Dawn were reported to be "generally very prosperous farmers — of good morals, and mostly Methodists and Baptists." Out of three or four thousand coloured people not one, says Josiah Henson, was sent to gaol for any infraction of the law during the seven years from 1845 to 1852.

In 1852 the Anti-Slavery Society of Canada reported that there were about 30,000 coloured residents in Upper Canada, nearly all being refugees. About ten years later Principal Willis, of Knox College, who took deep interest in their condition, estimated the number at 60,000. This was doubtless an over-estimate. After the War the number very greatly decreased, many returning to the northern tier of states and some further south.

The Canadian census of 1901 reports in the whole Dominion 17,437 negroes, more than half of whom, namely, 8,935, dwell in

Ontario, 5,984 in Nova Scotia, 1,368 in New Brunswick, and only 532 in British Columbia, and 280 in Quebec.[1]

A few of the refugees followed the blacksmith and carpenter trades, fewer still kept small stores, and some accumulated real estate and a degree of wealth. Many of them owned small neat homes, though sometimes the unthrift inherited from slavery days was seen in the unkempt and dilapidated premises. Dr. Howe considered their state better than that of the foreign immigrants in the same regions. Sunday schools were early established in the negro settlements, the Bible was read with interest in many humble homes, not a few learning to read and write after reaching adult years.

The tendency of the negroes to association was shown in the organization of what were known as "True Bands," a sort of mutual improvement clubs; one at Chatham had a membership of 375, and one at Malden a membership of about 600. Religious organizations were formed among them, chiefly of the Methodist and Baptist persuasion, perpetuating the modes of worship of these churches in the Southern States. Most of the meeting places were devoid of architectural pretensions and were sometimes rude and almost primitive. The worship was largely of an emotional character, marked by the vigour and often the eloquence of the address and the beauty of the singing, which were not infrequently accompanied by hand clapping and other physical demonstration.

Among their ministers were some very devout and pious men, some of them possessing much ability and persuasive eloquence. Of these we may mention the Revs. Wm. Mitchell, Josiah Henson, Elder Hawkins, and Bishop Disney of the Methodist Episcopal Church. (The latter three were born slaves.) They accomplished much good among the coloured race in Canada. A few of the negroes joined white churches, but for the most part they worshipped together. The franchise was freely given them on the payment of the same amount of taxes as was paid by the white people.

As may well be imagined many touching scenes took place as each band of fugitives reached the land of liberty. Many families long separated were re-united. "Each new band of pilgrims as it came ashore at some Canadian port was scanned by little groups of negroes eagerly looking for familiar faces. Strange and solemn reunions, after years of separation and hardship, took place along the friendly shores of Canada."

---

[1] The negro population seems to be continuously decreasing in the Dominion. The census of 1871 reports a total of 21,496, not including Prince Edward Island, Manitoba, British Columbia and the Territories, which were not then in the Dominion. Of these, 13,435 were in Ontario, 6,212 in Nova Scotia, 1,701 in New Brunswick, and 148 in Quebec. In 1881 the negro population in the whole Dominion was 21,394, of whom 12,097 were in Ontario, 7,062 in Nova Scotia, 1,638 in New Brunswick, 274 in British Columbia, 155 in Prince Edward Island, 141 in Quebec, 25 in Manitoba, and 2 in the Territories.

A large number of fugitives from slavery considered themselves safe, at least till after 1850, within the borders of the Free States. Josiah Henson estimated that in 1852 there were as many as 50,000 former slaves living in the various Free States. But this was always at considerable risk of being kidnapped or, after the Fugitive Slave Act of 1850, of being legally restored to bondage. "The Southern people," says Professor Siebert, "apparently regarded their right to recover their escaped slaves as unquestionable as their right to reclaim their strayed cattle, and they were determined to have the former as freely and fully recognized in the North as the latter."

There sprang up a class of men who made it their business to track runaway slaves. They watched the advertisements of such runaways, and haunted the abolition communities or towns for their detection. The Rev. L. B. Grimes, a coloured man, had organized a church of fugitive slaves in Boston. On the enactment of the Fugitive Slave Bill forty of them fled to Canada. One of the number, Shadrach, was arrested, but made his escape. Sims, another, under guard of three hundred Boston policemen, was restored to slavery.

The Rev. J. S. C. Abbott recites a stirring story of another rescue in Boston. A fugitive slave girl married a coloured man named Crafts in that city. To them were born two children. "A young, healthy, energetic mother with two fine boys was a rich prize." An attempt was, therefore, made in 1852 to abduct them. "These Boston boys," says Siebert, "born beneath the shadow of Faneuil Hall, the sons of a free citizen of Boston, and educated in the Boston free schools, were, by the compromises of the Constitution, admitted to be slaves, the property of a South Carolinian planter. The Boston father had no right to his own sons." Warned in time the mother fled with her children and escaped by a Cunard steamer to Halifax.

Senator Charles Sumner declared that "as many as six thousand Christian men and women, meritorious persons,—a *larger band than that of the escaping Puritans,*—precipitately fled from homes which they had established."

The Coloured Baptist Church of Rochester out of a membership of one hundred and fourteen fugitive slaves lost a hundred and twelve, including the pastor who fled for safety to Canada. Similar numbers escaped from Buffalo, Detroit and other border cities. The persons who aided the escape of such fugitives were subject to severe penalties even before the passage of the Fugitive Slave Act. In 1847 Mr. Giltner, of Kentucky, was amerced in fines of $2,752 for such an offence. In 1850, Mr. Newton, of Michigan, was fined the sum of $2,850 for aiding fugitive slaves, and against Mr. R. R. Sloan, of Sandusky, Ohio, was given a verdict of $3,330 for aiding the escape of fugitive slaves, besides $1,393 in law costs. For hindering the arrest of a fugitive in 1855, Mr. Booth, of Wisconsin, was imprisoned one month and amerced in a penalty of $1,451. In 1856 Margaret Garner, a slave woman, fled with her four children to Cincinnati, Ohio. Frenzied with fear of capture she killed her favourite child, but with the surviving children was restored to slavery.

The Canadian freedmen gave a warm welcome to the fugitives. A declaration which they issued ran in part as follows: "Including our children, we number here in Canada 20,000 souls. The population in the free states are, with few exceptions, the fugitive slave's friends. We are poor. We can do little more for your deliverance than pray to God for it. We will furnish you with pocket compasses, and in the dark nights you can run away."

Upon the passage of the Fugitive Slave Law in 1850, Joshua R. Giddings, of Ohio, declared: "The freemen of Ohio will never turn out to chase the panting fugitive. They will never be metamorphosed into bloodhounds, to track him to his hiding-place, and seize and drag him out, and deliver him to his tormentors. Rely upon it they will die first . . . . Let no man tell me there is no higher law than this Fugitive Bill. We feel there is a law of right, of justice, of freedom, implanted in the breast of every intelligent human being, that bids him look with scorn upon the libel on all that is called law."

"Villages, towns and cities from Iowa to Maine," says Professor Siebert, "but especially in the middle states, witnessed scenes calculated to awaken the popular detestation of slavery as it had never been awakened before. Pitiable distress fell upon the fugitive settlers in the North and did much to quicken consciences everywhere. The capture of a fugitive in the place where he had been living invariably caused an outburst of indignation."

The appearance of Mrs. Stowe's "Uncle Tom's Cabin," in 1850, and of its Key of corroborative evidence in 1853, aroused the conscience of the North like the peal of a clarion. In 1854, Anthony Burns, a fugitive slave was arrested in Boston; but, through the zeal of the abolitionists the city was set ablaze with excitement. At a meeting held in Faneuil Hall it was decided to rescue Burns by force from the Court-House gaol which, defended by troops, had the air of a beleagured fortress. A thousand soldiers furnished with loaded cannon, assisted by four platoons of marines and battalion of artillery conducted Burns to the United States revenue cutter by which he was carried back to Virginia. Fifty thousand people lined the streets, greeted the procession with hisses and groans and displayed emblems of mourning and shame.

It does not lie within the scope of this paper to describe the Free Soil struggles in Kansas, nor the career of John Brown, but Professor Siebert quotes the estimate that the "attack on Harper's Ferry caused the value of slave property in Virginia to decline to the extent of ten million dollars." Not a few thoughtful minds agreed that the existence of the Underground Railway was on the whole a fortunate thing for the slave states; that it was, as the negro historian, Williams, has said: "a safety valve to the institution of slavery. As soon as leaders arose among the slaves, who refused to endure the yoke, they would go North. Had they remained, there must have have been enacted at the South the direful scenes of San Domingo."

General Quitman, Governor of Louisiana, declared in 1850 that the South had lost 100,000 slaves in the previous forty years whose value he estimated at $30,000,000. Both the number of fugitives and their value were, doubtless, very much exaggerated. In addition to these it is alleged that the American Colonization Society, whose object was to remove free blacks from the South to the coast of Africa, sent out in forty years previous to 1857, 9,502 emigrants. The solution of the slavery problem was evidently not repatriation in their original home.

In the year 1860 a very stirring international episode occurred in the city of Toronto. It was one of the most remarkable cases ever tried in Canada, both from the public sympathy that was called forth and from the points of law involved. A very dull account of this trial is given both in the Upper Canada Queen's Bench Reports and Common Pleas Reports.[1] The facts of the case were as follows: John Anderson, a slave belonging to one McDonald, in Missouri, had left his owner's house with the intention of escaping from slavery. About thirty miles from his home he met with one Diggs, a planter, working in a field with his negroes. Diggs told Anderson that as he had not a pass he could not allow him to proceed. Anderson tried to run away from his captor when Diggs ordered his slaves, four in number, to take him a prisoner. Diggs himself attempted his arrest, was stabbed by Anderson, and in a few days died of his wound. Anderson in the meantime made good his escape and got away to Canada. This was in September, 1853. After seven years' residence in Canada Anderson was tracked by a slave catcher, charged with murder, and his surrender demanded under a clause of the Ashburton Treaty providing for the extradition of slaves guilty of crimes committed in the United States. Lord Elgin, the Governor-General of Canada, in response to an appeal on behalf of Anderson, replied to the effect that "in case of a demand for John Anderson, he should require the case to be tried in their British court; and if twelve freeholders should testify that he had been a man of integrity since his arrival in their dominion, it should clear him."

---

[1] Queen's Bench Reports, Vol. XX., Second Ed., pp. 124-193, Michaelmas Term, 24 Victoria, 1860. Court of Common Pleas Reports, Vol. XI., Second Ed., pp. 9-72, Hilary Term, 24 Victoria.

The magistrate who examined the case decided that the charge against Anderson was sustained. The case was brought before the Court of Queen's Bench, Toronto, which court decided that Anderson should be given up. Intense excitement was created throughout the country by this decision. Public meetings were held and strong protests were made against the surrender of the hunted fugitive. It argued that in defending himself against recapture to bondage and to condign punishment and probably a cruel death he was exercising an inalienable right. The Court of Queen's Bench gave a decision. Justice McLean strongly dissenting, not for his surrender, but against his discharge, leaving him to be dealt with by the Government which might find sufficient reasons for not complying with the requisition from the United States. Justice McLean expressed his strong dissent in these words: "Can, then, or must, the law of slavery in Missouri be recognized by us to such an extent as to make it murder in Missouri, while it is justifiable in this province to do precisely the same act? . . . . In administering the law of a British province, I can never feel bound to recognize as law any enactment which can convert into chattels a very large number of the human race. I think that on every ground the prisoner is entitled to be discharged."

So profound was the interest in this case that after the decision in Canada became known in England, the Habeas Corpus was applied for and granted by the Court of Queen's Bench in that country. Before that could be executed, however, the prisoner had obtained a similar writ from the Court of Common Pleas in Canada. The result was that the prisoner was discharged on the grounds of informality of his committal. There can be little doubt, however, that all the legal resources of Great Britain would have been employed for the defence of this lowly black prisoner.

The present writer has a very vivid recollection of a great public meeting of sympathy with this fugitive slave, held in St. Lawrence Hall, Toronto, in which the Hon. George Brown and Dr. Daniel Wilson, President of Toronto University, took a prominent part. He was also present at the reading of the decisions of three judges before the Court of Queen's Bench at Toronto. It was an occasion of thrilling interest. The fugitive slave was brought to the court in a cab surrounded by a strong body of police carrying muskets with fixed bayonets — so great was the fear of a popular rescue. Chief Justice Robinson gave a learned judgment to the effect that Anderson should be given up. Judge Burns followed in an impressive address to the same effect. During the reading of these judgments, which were heard in death-like silence, the poor negro turned almost pale with trepidation. As Judge McLean pronounced his decision that the prisoner should *not* be surrendered, a cheer that could not be restrained, burst from the lips of the audience, was caught up by the thousands gathered outside of the hall, and rang from street to street till the news was known throughout the city.

Co-incident with these events was the secession of South Carolina and the organization of the Southern Confederacy. Then followed the four years' war with, as one of its results, the abolition of the last vestige of slavery on this continent.

III.—*The Old Basque Tombstones at Placentia.*

By RT. REV. BISHOP HOWLEY.

(Read May 27, 1902.)

In the primitive old wooden church (Anglican) at Placentia, the ancient French capital of Newfoundland, are still to be seen the *disjecta membra* of a few tombstones of the seventeenth and eighteenth centuries, relics of the Old Basque and French settlements.

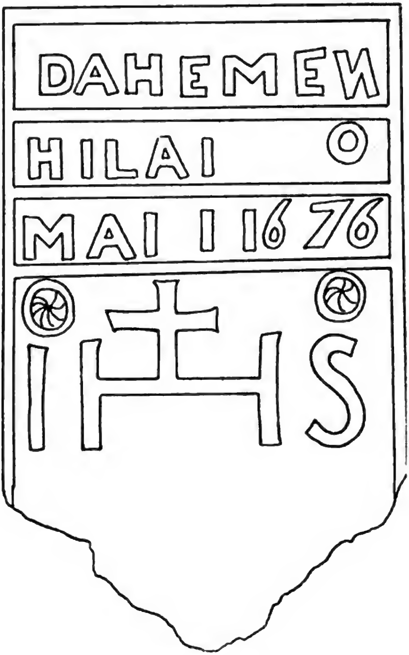
These interesting old monuments were rescued a few years ago by order, if I mistake not, of the late Governor Glover, from the graveyard, and placed within the church for safety. But even there, so badly had they suffered from the ravages of time, they are fast crumbling to decay, being in a much worse and less legible condition now than they were the first time I examined them about twenty years ago.

Several unsuccessful attempts have been made to decipher these inscriptions, but as far as I am aware, the first attempt at reproducing a fac-simile of them, was made by the present writer. I had them engraved and published in my "Ecclesiastical History of Newfoundland." I have several times since then examined the stones. I found that my original copies though fairly exact were not altogether correct. In December last (1901) I made a final and most careful study of them, spending part of two days at the work, and I am now prepared to present to the readers of the "Transactions," copies as near to fac-similes as can be obtained without the aid of photography. I have also been fortunate in obtaining a correct interpretation of the inscriptions which have hitherto puzzled completely all historians, antiquaries and philologists.

The engravings here presented have been made from my own drawings by our talented young fellow-townsman, Mr. D. Carroll. Since my last inspection of the stones an attempt has been made to photograph them by Mr. Figary, photographer, Placentia. They were not quite a success, on account of the stones being in such a dilapidated condition.

There are altogether five stones or fragments of stones bearing inscriptions. Of these, two (which afterwards will be shown to be parts of one inscription) are in French, and three in Basque. These latter are the most interesting, and have been undeciphered up to the present time. In my "History," page 144, I stated that "The language is distinctly Latin, though one or two of the words are unintelligible."

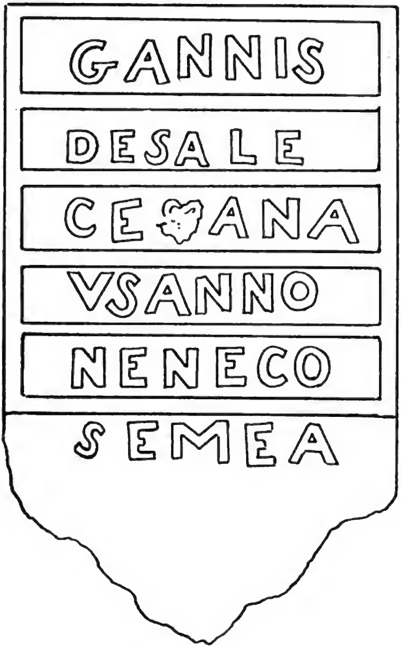
The late Professor Robinson Smith of Cambridge, one of the editors of the Encyclopædia Britannica, and an expert philologist, to whom copies of the inscriptions were sent in 1886, pronounced some of the words to be Basque. Now that we have correct copies, we find that they are all pure Basque with the exception of one word which is French.



No. 1 (front).

We owe the correct reading and interpretation of the epitaphs to the Right Revd. Monseigneur LeGasse, Prefect Apostolic of St. Pierre, Miquelon. This learned prelate is a Basque by birth, and not only speaks the language as his native tongue but is also a scholar in the grammar and literature of this very unique and interesting language. On paying a visit to St. John's, in the summer of 1900, he remained a day or two at Placentia and made a careful and intelligent study of the stones. We afterwards compared his copies with mine, and found that they agreed substantially, but with a few slight discrepancies.

The first stone bears the date of 1676, the oldest yet discovered. The letters stand out in bold relief, the surface of the stone having been sunk in. They are about three inches high, and are fairly well cut. The lines of the inscription are separated by bands or fillets, also in relief. This stone is engraved on both sides, a rather unusual thing.



No. 1 (back).

The explanation of the inscription is as follows:—DA HEMEN. This is the ordinary phrase so common in epitaphs in all languages, "These two narrow words *Hic jacet*, *Cy git*, "Here lies," "which "have drawne together all the farre stretched greatnesse, all the "pride, crueltie, and ambition of men" (Sir W. Raleigh). Literally in the Basque it reads, "is here," or, "here is." Da. is the third person singular of the verb *to be.* *Hemen*, here. The next line contains the word *Hila I*, then a blank space and then *O*. The word *Hila* means dead, *mortuus*. The letter I, according to Mgr. LeGasse, belongs to another word, the body of which is effaced, leaving only this first letter I and the final O. It probably refers to the day of the week. This portion of the inscription then means "*Here lies dead.*" In the "Hand Book of Newfoundland, and Tourists' Guide," published by the late Rev. Dr. M. Harvey, the following incorrect explanation of these words is given. "The name of the occupant of the grave was probably Dahemen Hilaire"!

The third and last line of the inscription on this side of the stone reads M A I I 1676.

In copying this inscription for the first time, I took this word for the Latin *Maii*, the genitive case of *Maius*, May. This, together with the words *Anno* and *Hila* (ri) O caused me to assert in my History, "that the language is distinctly Latin." On close examination, however, there appears a space between the two I's thus M A I I showing that they do not belong to the same word and that the correct reading is Mai I (one or first), viz, May 1st. The word is French and is the only French word on the tombstone. The Basque word for May is *Mayatcea*, and "in May," Mayatcean. Thus, for example:—"*Mayatcean egina da*," It is done in May. Literally, "May in done (or made) is."

Next comes the date 1676 which, as I stated before, is the oldest yet found. It is about thirty-six years previous to the abandonment of Placentia by the French and Basques at the Treaty of Utrecht (1713). Beneath this is the well known Christian monogram I.H.S., surmounted by the Cross, being the initials of *Jesus Hominum Salvator*: (Jesus Saviour of men).

On the back of the stone we read as follows:—First line. GANNIS, pronounced Gannish, this is a correct form of the name of John in the Basque tongue.

There are three other forms or methods of spelling this name, viz.:—Joanes, Joannis and Jouannes, all of which are to be found on these inscriptions as we shall see. The next word *De Sale* gives the family name of the deceased. The name is one of nobility as designated by the prefix *De*. It is still a frequent name in the Basque Provinces. Monseigneur LeGasse states that he had schoolfellows who bore the name. The renowned St. Francis De Sales, Bishop of Geneva, was a member of this family. The third line is somewhat damaged and difficult to decipher. As well as can be made out it reads *Cesana*, but such a word is not known in the language. It may be a proper name. The fourth and fifth lines read as follows: —

Usanno — Neneco.

These words should be divided as follows: — *Usann, Oneneco. Usan* means odour, or perfume. The proper orthography is *Usan*, but it is pronounced by the people with a strong accent on the latter syllable, hence they have doubled the *N* in the inscription. *Oneneco* means "the best." It is in the genitive case, and in a provincial form or *patois.* Thus, *Ona* means good; hobea, better; hobeago, or hoberena, the best, genitive *onenena*, of the best, and provincially *oneneco.* Hence the two words *Usan oneneco*, mean "of the best, or sweetest odour" (*optimi odoris*). This probably was the name of the house, homestead, manor, villa or townland of the family. It may have been so called on account of its fertility, and in happy allusion to the Scriptural expression of Isaac and Jacob (Genesis XVIII., 29) "*Odor filii mei sicut odor agri pleni*" (the smell of my son is as the smell of a plentiful field).

The sixth and last line contains the one word, SEMEA, "The son." There is no definite Article in the Basque language. The effect is produced by adding the termination *A*. Thus, SEME means Son, or A Son, SEMEA, The Son.

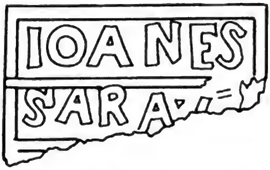
The whole inscription then reads as follows: —

"Here lies dead (or having died)
(on) The first of May 1676
John De Sale Ce——ana
The Son (or heir) of (the House)
of Sweetest Odour."

The words of the inscription *Gannis de Sale Cesana Usann Oneneco Semea* are given in the following garbled manner in Harvey's "Hand Book":—"*Canus de Tale le Araus Anno nenego Semea!*" This is I presume the corrupt form in which the inscription was sent to Professor Robinson, and it is not to be wondered at, that that distinguished philologist could make nothing of it.

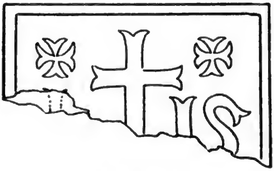
As many tourists are of late years beginning to visit Newfoundland, it is to be hoped that a correct and authentic *Guide Book* may soon be published.

The next stone (No. 2) is only a small fragment containing a portion of the proper name IOANES SARA.



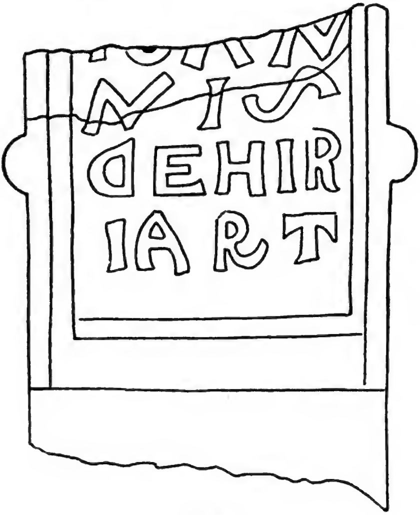
No. 2 (front).

The stone is 14 inches wide, 3 inches thick, and 9½ inches in length at the longer side, it is broken unequally. The letters are bold and well cut in high relief about three inches in height. Each line is separated as in No. 1, by a fillet or band in relief. This stone is chiefly interesting as giving us a second form of the Basque name for John. On the back of this stone is to be seen a portion of the Christian monogram I. H. S. with the Cross and letters very neatly cut (also in relief) in the ornamented form known in Heraldry as *Moline.* There are also two very neatly designed Maltese crosses in the corners.



No. 2 (back).

The third stone which I show here is considerably dilapidated. The top part is missing, but fortunately there is enough left to enable us to decipher the name. *Joannis* (pronounced Joannish). Here we have a third form of the name John. The surname is Dehiriart, a name still quite well known as a family name in the Basque Provinces. The letters on this stone are also in relief, but they are sprawling and much more crude than the others, neither are the lines separated by the band or fillet. The width of the stone is sixteen inches. The height of the portion now remaining is about two feet five inches. Since my first visit another piece has been broken off, and it is probable that in a few years they will be all totally destroyed. Only three lines and the lower portion of a fourth now remain. The top line contains the lower half of the letters *I O A N*. The second line *N I S* completing the word Ioannis.

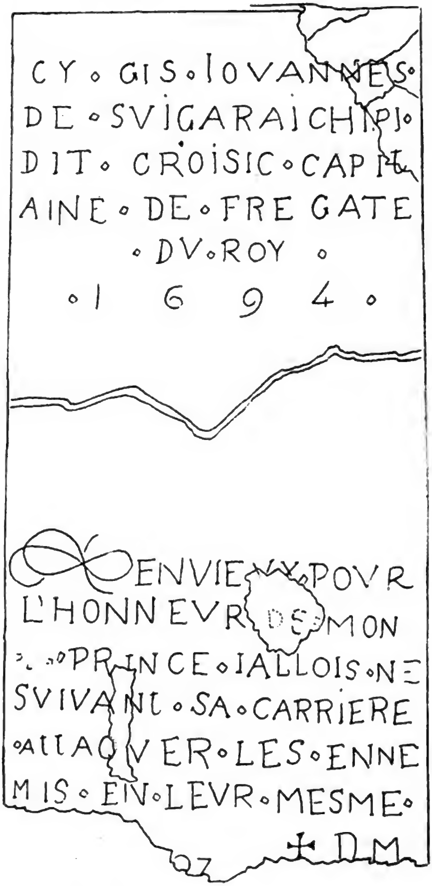


No. 3.

The third line D E H I R. The D is turned wrongly, the circular part being towards the left. The fourth line contains the letters I A R T being the conclusion of the name.

The French Stones

are rapidly falling to pieces, and will soon be entirely destroyed unless some measures be taken to preserve them. The cutting of the letters is in an inferior style as compared with the Basque stones. The letters are not standing out in relief, but simply incised. There are now two distinct stones, as I have said, but I find on referring to my notebook that when I first copied these inscriptions (now nearly thirty years since) I referred to them as being both upon one stone. (See Note at foot of this article.) I was rather surprised then and somewhat taken aback when I learned from Mgr. LeGasse that they are on two distinct stones. My interpretation, as will appear further on, requires that they should be on *one stone only*, as I believe the second inscription is only a continuation of the first. It was there-



fore with some misgivings that I went to view the stones in December last. However, on careful examination I was soon reassured. It is true that there are now two distinct stones; but the first thing I noticed was that being of a laminated structure like slate they are quite easily split, and are in fact all coming away in thin slabs. I saw at once that the backs of both stones as they now stand are quite new and fresh and also irregular in thickness. I immediately came to the conclusion that the stone had recently become split or cleft in twain. On measuring the stones, I found them both to be of exactly the same width (2 ft. 9 in.). The thickness of each piece is about three inches, and, allowing an inch or half an inch to have "spawled" off, if both were put together it would give a thickness of nearly seven inches. This may seem abnormal. However, on measuring another of the stones there present I found it to be seven inches in thickness. The objection, that it is not customary to have an inscription on *two sides* of a tombstone, vanishes before the actual fact of the Basque stone described above.

Finally, to make assurance doubly sure, I took a small piece from each of these stones, a *sliver* from the back of each, and submitted them to a geological expert, J. P. Howley, Esq., F.G.S., asking his opinion of them. The following is an extract of his letter:

ST. JOHN'S,
Jan'y 14th, 1902.

" . . . . I have again carefully examined the two pieces of stone with "a microscope, and am convinced beyond doubt that both mineralogically "and lithologically they are identical in every respect. It is almost equally "certain that they must have been derived from the same stratum, if not "from the same slab."

(Sgd.), JAS. P. HOWLEY.

Let us now take up the consideration of the inscription on the stone. The date is 1694, some nineteen years before the French abandoned Placentia, at the Treaty of Utrecht, 1713; and some eighteen years later than the Basque stone of 1676. This French stone is of historical value as showing the transitionary state of the population at the time. Although it is erected to the memory of a Basque, yet the language is French. We find in the historical records of Placentia, about this date (1684) a despatch or Report from Governor Parat in which he complains of the "insolence" of the Basques ("*ils font mille insolences*"), and he threatens to chastise them. It is evident that they were beginning to lose ground and to give way before the French and Breton population.

The whole of the inscription on this stone as far as legible, is in French, except the name of the person over whose remains it was erected. The name, as we shall see, is pure Basque. The orthography is not perfect, but rather phonetic. However, the matter of correct spelling was not a mark of illiteracy in those days either in English or French, and especially among nautical persons. Hence we find the well known formula *Cy Gît* appearing as *Cy Gis*. Then we have the Basque name for John, in the fourth form, *Jouannes*. This is also a quite correct form. Next comes the family name *Suigarai-Chipi*, a thoroughly Basque name. The termination Chipi, pronounced *Kipi* or tchipi (it is not possible to express the exact sound in English letters) is a diminutive, meaning small or little. The inscription then tells us that this man was also called *Croisic* (*Dit Croisic*). This form of family nomenclature is quite common among French speaking people. The name Le Croisic is that of a small seacoast town in the Loire Inférieure, Brittany, near St. Nazaire, at the mouth of the River Loire In these days there was much communication between the Basques and the Bretons. They were the pioneers of French colonization. Hence, we may suppose that the family of Suigarai settled in Le Croisic from which he took his second name, or what is more probable the name Croisic was a Basque family name which they gave to this village on settling there. M. Elizée Reclus, in his *Géographie Universelle* (Div. III., p. 230), speaking of Le Croisic and Batz, a neighbouring village, says: — "Out of a population of 2,750 persons nearly one-half belong to eight families. Under these circumstances, family names and surnames do not suffice and nearly every individual is known by some soubriquet." This accounts for the second name (*Dit Croisic*) and is of considerable historical and ethnological interest. It is therefore painful to find that the Newfoundland "Guide Book," missing altogether the antiquarian interest of this subject, treats it in the following trivial manner: — "The next oldest stone is that of a Captain of a French King's frigate, who rejoiced in the Breton name of *Johannes de Sulgaraichipi* (*sic*). *He was good enough, however, to shorten it into Croisic for everyday use!*"

We next read that this Suigarai was "*Capitaine de Fregate*" du Roy. Capitaine de Fregate is a regular official grade in the French Navy, just as Capitaine de Pavillon, Flagship Captain or Commodore; Capitaine de Vaisseau—post Captain, or duly gazetted Captain. The Capitaine de Fregate, was a minor degree, nearly equivalent to our English grade of Commander. "The King" of course, in this case, was Louis XIV., whose long reign of seventy-two years (1643 tc 1715) extended over the reigns of nine English rulers, including the Commonwealth.

Turning to the second inscription, which I consider to be a continuation of the previous one, and to have been originally on the back of the same stone; if taken by itself it will be found altogether incomplete, giving neither name nor date, whereas I undertake to show that it forms a natural sequence to the former. To begin, I must state that it is very much broken and obliterated, so that in a short time it will be altogether illegible. It commences with what appears to be merely an ornamental scroll or flourish, but which I now think is intended to contain the letter L' with an apostrophe. The first word is partly destroyed. The first three letters E.N.V. are clearly decipherable, after which there appeared to be a portion of a Y, and at first I read it *Envoyé* (sent), which would make sense with the following words: "For the honour of my Prince I went to attack the enemy, etc." But on close inspection I found the word *Envoyé* would not suit, as the letter immediately after the V proved unmistakably to be an I, and the last letter was discovered to be the remains of an X. I immediately pronounced the word to be "*Envieux*" which, in the sense of "desirous for the honour, etc.," would also make good sense. But finally the true interpretation broke in upon me. The word is indeed *Envieux*, but in an entirely different sense. In my studies of the history of these times from the "*Documents Relatifs à la Nouvelle France*," I found the Royal Frigate "*L'Envieux*" playing a very conspicuous part in the events of that troubled period. I find the earliest mention of her in a letter from M. de Frontenac, Governor of Quebec, to the Prime Minister of France, dated Quebec, 15th Sept., 1691. At this time the "Vaisseau L'Envieux" was commanded by Le Sieur de Bonaventure. Le Sieur Le Moyne D'Iberville was aboard with some troops for the capture of Fort Nelson. In a letter from the King (Louis XIV.) to Le Sieur de Villebon, Commandant of the troops in Acadie, dated at Versailles, April, 1692, the King orders the "Vaisseau L'Envieux" to be sent to him (Villebon) at the River St. John (*N.B.*), with soldiers and munitions of war, provisions, money, etc. He is to make war on the English "*Sans relasche.*" The *Envieux* is still commanded by De Bonaventure. In 1692 the "*Envieux,*" accompanied by the "*Joly,*" attacked Pemscuit (Pumkit). Shortly after this, the "*Joly*" was lost on the coast of Newfoundland. In 1694, the date of our tombstone, I find Le Sieur de Bonaventure transferred to the command of the "*Bretonne.*" Though the "*Envieux*" still occupies the stage, unfortunately, the name of her new commander is not given. We find, however, that De Bonaventure, in command of "*La Bretonne.* left La Rochelle on the 8th of April, 1694, in company with Captain Baptiste, of the corvette "*La Bonne.*"

The latter was captured by the English on May 24th, 1695, at St. John (N.B.), the captain and crew escaped to land. On the

22nd of July. he says: "I embarked aboard the '*Envieux*' to return to France." On her homeward journey the "*Envieux*" touched at Placentia on August 12th, and remained till the end of September to convoy home the fishing vessels. In 1695 (December) I find the "*Envieux*" again in charge of De Bonaventure. From this it will be seen that there is *lacuna* in the history of the movements of the "*Envieux*." But there is time for a short period of captainship by poor *Suigaraichipi* before his death in 1694. My reading of the inscription then is this:—"Here lies, etc., Captain of the frigate of the King, L'Envieux: For the honour of, etc., I went to attack, etc."

The next words that cause some trouble are: "Mon......... Prince," The letters *Mon* are quite clear, and I at first read it "*My Prince*," meaning, as I thought, "*My King*." But I then noticed portions of some letters, almost illegible, at the beginning of the third line, before the word "*Prince*." I also noticed that the stone was frayed away somewhat after the word or letters *Mon*, at the end of the second line, and that there had been room for a letter or two there. Also that immediately before the word "*Prince*" is to be distinctly observed the little diamond stop which is used to separate one word from another, and which is rarely placed at the beginning of a line. My interpretation of this part of the inscription then, is this:—

................MONS'R
LE ◇ PRINCE.............

This would apply to Philip, Duke of Chartres and Orleans, brother of the King (Louis XIV.), whom he had appointed Commander-in-Chief of the Army and Navy, and whose official title was Monsieur Le Prince. Here there is a transition of the grammatical construction of the epitaph from the third to the first person, and the subject of the inscription (Suigarai) is represented as speaking himself: "*J'allois*," I went, etc. The next word, last of the third line, has puzzled me. The word is clearly NE; but as such it makes no sense. I have come to the conclusion that it is a mistake for EN, which, with the participle *Suivant*, makes good French (in following). Here again the construction changes back to the third person. "*Sa Carriere*," unless the pronoun *Sa* be referred to *Monsieur le Prince*, but that would be a strained interpretation. "His Career," or the career appointed for me by him. From this down the stone is very much broken up, and the last part is entirely missing. It reads as follows:—"*J'allois en suivant sa carriere, attaquer les enemies en leur mesme* . . . . . "I went, in following out his (qu My?) career to attack the enemy even in their own." . . . . The final word is missing. It would doubtless be some word to express harbours, forts, countries, waters, etc., qu. Demeurs.

In looking over the "*Documents*," etc., I find at about this date (7th March, 1693) a despatch from the Minister at Versailles to Monsieur du Brouillant, Governor of Placentia, in which there are some words which bear a striking resemblance to those on the tombstone. The Minister informs the Governor that he cannot this year supply him with the two, nor even one, frigates (*des deux ny d'une fregattes*) which he had asked for, but the King had engaged a company of merchants of St. Malo to go and make war on the English established on the coast of Newfoundland, "*Mesme pour les attaquer!*" These words were almost identical with those on the tombstone, and the coincidence is remarkable, probably the expression may have had some special significance about that period.

There only now remains to be considered the two letters or parts of letters which are to be seen in the right hand lower corner of the stone. They appear like P, or D, M, preceded by a small Greek cross such as is used before the signature of a Bishop, or of a prayer or blessing in the Roman Missal and Ritual. It may probably be the initials of the sculptor, or perhaps the last part of "Priez, P. M. (*pray for me*) pour moi."

There are at Placentia many other interesting relics, old MSS., with autograph of Louis XIV.; old forts and batteries, etc., which, together with the beautiful natural scenery, make it a place worthy of a visit from the tourist and antiquary. These subjects may possibly claim attention for a contribution to a future volume of the "Transactions of the Royal Society of Canada."

NOTE.

When I first visited Placentia, some thirty years ago, and examined the stones, I find by my notes that I stated that the two French inscriptions, commencing respectively "CY GIS" and "L'ENVIEUX," were on one and the same stone. When Mgr. LeGasse informed me last year that they are on two different stones, I was surprised, as I considered one inscription to be only the complement of the other, and that they are incomplete (especially the second one) if taken separately. On my subsequent visit, I found that it appeared that the learned Prelate was correct, and that they were in reality on two different stones. On measuring and examining again attentively, I found:—

1st. That the two stones were exactly the same width;

2nd. That both were split, neither being of its original thickness; and

3rd. I took a piece from each and had them examined by a geologist, who declared that they were both of the same geological formation.

I then concluded (as in the text of my article) that the stone had been split in twain, and that originally the inscriptions had stood back to back, one on each side of an *upright* stone.

Now, quite recently (Sept. 21st, 1902), I have once more examined the stones, and made a discovery which, while it places beyond doubt my theory that the two inscriptions belong to the same stone, and thus verifies my notes taken in 1872, yet changes somewhat the line of my argument. I now find that by placing the two pieces of stone together, not back to back, but end to end, they fit exactly (as shown in engraving), and that the stone, besides being split, has been cracked across the middle irregularly, and that the two inscriptions were on one side only of the stone, viz., at the head and foot of it, leaving a vacant space in the middle. The stone must have been at least eight feet long, and hence was not an *upright* monument, but what is known as an altar or table tomb, the top of which was lying horizontally. This explains the otherwise puzzling fact of the vacant space, which in the former theory, would be *above* the first words of the inscription, commencing "*L'Envieux.*" If the stone were placed upright it would be impossible to account for the inscription commencing so far down on the stone, and leaving such a large space vacant above. But if we consider the two stones as one, and lying horizontal, the vacant space will be in the *middle*, and was probably filled by some object, such as a lamb, a bust, a cross, a ship, etc., standing upright on the stone. This would explain all admirably.

I may also mention that the name SARA is not, as I stated, the name of a man, but of a province or township, so called up to the present day. M.F.H.

IV.—*The First Legislators of Upper Canada.*

By C. C. JAMES, Toronto, Ont.

(Communicated by Sir John Bourinot, and read May 27, 1902.)

In the terms of capitulation at Montreal, in 1760, Ontario was referred to as "le pays d'en haut" (the upper country). Three years later (10th February, 1763) the formal transfer took place under the Treaty of Paris, in these words:

"His most Christian Majesty cedes and guarantees to his said Britannic Majesty, in full right, Canada with all its dependencies, as well as the Island of Cape Breton and all the other islands and coasts in the Gulf and River St. Lawrence."

There was no attempt at defining the western boundaries or limits of Canada; there was no necessity for further definition; the people of Canada were understood to be those living in immediate relationship to Quebec, Three Rivers, and Montreal. On the 7th of October of the same year, however, a Royal Proclamation was issued which fixed the limits of Quebec as follows:

"The Government of Quebec, bounded on the Labrador Coast by the River St. John, and from thence by a line drawn from the head of that river through the Lake St. John to the south end of the Lake Nipissing; from whence the said line, crossing the River St. Lawrence and the Lake Champlain in forty-five degrees of north latitude, passes along the highlands which divide the rivers that empty themselves into the said River St. Lawrence from those which fall into the sea; and also along the north coast of the Baye des Chaleurs and the Coast of the Gulf of St. Lawrence to Cape Rosières, and from thence crossing the mouth of the River St. Lawrence by the west end of the Island of Anticosti terminates at the aforesaid River St. John."

Allowing for some incongruities in these lines we find that by this proclamation the part of Ontario lying east of a line drawn from Cornwall to the south-western end of Lake Nipissing was then included in Quebec.

By the Quebec Act of 1774 the boundaries were carried westward to include the remainder of Ontario to the Great Lakes and also a portion of the present United States lying east of the Mississippi and north of the Ohio River.

Two years later came the outbreak of the Revolutionary War. By the settlement in the Treaty of Paris, 3rd September, 1783, the land to the south and west of the Great Lakes was cut off from

Quebec and the boundary line fixed through the lakes and the connecting rivers.

Then began the locating of the Loyalists, the settlers coming in more rapidly than the surveyors could run their lines. The settlements were made in four somewhat distinct groups, which may be named, for convenience, the St. Lawrence, the Bay of Quinté, the Niagara, and the Detroit. Before referring to these in particular it may be well to state that discharged loyalist soldiers formed the nucleus of every settlement. As a rule the various regiments were allotted separate townships and at first took up land together, accompanied by most of their officers. Each loyalist regiment had, as a rule, been raised within a certain area of the neighbouring States, so that the various townships were settled by little groups of persons who had come from the same section, were fairly well acquainted with one another, and to a certain extent were inter-related by marriage. The result of this was to reproduce here the characteristics of their original home districts, and to give an individuality to each township. There was a variety in the make-up and therefore in the views and modes of life of the component township parts of these districts that is sometimes not fully recognized by writers and students of early times. Interesting fields of investigation await the historian and novelist in the study of the first Highland Scotch settlements, the German, the Dutch, and even the French Canadian settlements, and a visit to these parts to-day will show that they have not yet lost all of their early peculiarities. I stated that the officers, as a rule, settled along with their disbanded regiments. It was to be expected that these men who had been their leaders for seven or eight years should take the lead also in these various districts, and that when the time came for the choosing of legislators some of them should be selected as their representatives.

A few words now as to these four settlements. We begin at the east with the St. Lawrence section. Lancaster, the first township lying next to the old seigniory of New Longueuil, was passed by, for it was low and marshy, and hence was called "the sunken township." Beyond this, eight townships fronting on the river were surveyed, each one known as "No. so-and-so below Cataraqui."

Charlottenburg (No. 1) was settled by Scottish Highlanders, Roman Catholics; Cornwall (No. 2) and Osnabruck (No. 3) by Scottish Presbyterians; Williamsburg (No. 4) and Matilda (No. 5) by German Lutherans from Northern New York. Edwardsburg (No. 6), Augusta (No. 7) and Elizabethtown (No. 8) were more mixed in their composition. For fuller study of the five counties forming the St. Lawrence district, the various local histories may be consulted.

The Bay of Quinté District.— Beginning at Kingston, ten townships were surveyed around the Bay of Quinté, each one known as "No. so-and-so above Cataraqui." Here settled the second Battalion of Sir John Johnson's Royal New York Regiment, Major Rogers with his King's Rangers, Capt. Grass with his band from New York City, Major Van Alstine with his batteau men, a part of Jessup's Rangers, a small body of the Hessian Mercenaries, and a small but important body of Quakers from Dutchess County, N.Y. The Scottish element was not so prominent as in the St. Lawrence townships, but German and Dutch permeated the whole district. The student will also find two other interesting elements, though somewhat limited in numbers, namely, German-Irish, or Irish-Palatines, and French Huguenots.

At Niagara, settlement received an impetus because the fort on the eastern bank had remained in British hands and had been a haven of refuge for the loyalist families of the Mohawk valley. The discharged soldiers sought out their wives and children and crossed the river to take up the frontier lots of the newly surveyed townships of the peninsula. Butler's Rangers formed an important part of these first settlers, who soon occupied the townships from about where Hamilton now stands, to Long Point.

In the western district Detroit formed the headquarters, and here we find three interesting elements,— the British regulars and their officers; the French Canadians, descendants of the pioneer French families; and the British officers who had led the Indians in the wild western warfare that swept the forests from Mackinac to Pittsburg. When the time comes for this district to produce magistrates and representatives, we may expect them to come from these three classes.

Across from the old French settlement at Detroit, in 1747, was established the Indian Mission, and about it there gradually grew up a French settlement with Sandwich (L'Assomption) as its centre, an offshoot of old Quebec, where the French language still is spoken and where the French Canadian mode of life still prevails. On the shores of Lake Erie, westward from where Kingsville now stands, 97 lots were surveyed, and on these a mixed body of loyalists were settled, among them being some of Butler's Rangers. The Western or Detroit District then consisted at first of three settlements. Detroit, on the American side, the French Canadian settlement among the Indians about Pointe de Montreal, and the "two-connected townships" (Gosfield and Colchester) on Lake Erie. The township of Malden had few settlers until 1796, when Detroit was evacuated and Fort Amherstburg was erected to command the river. About the same time the lots along the River Thames began to be taken up.

It will now be seen that the people of the province were arranged in four groups, and when it became necessary to establish courts and land boards in 1788-89, the limits of the districts were easily determined as follows:—

Lunenburg, from Lancaster Township to the Gananoque River.

Mecklenburg, from the Gananoque to the Trent.

Nassau, from the Trent to the eastern end of Long Point.

Hesse, from Long Point to the Detroit.

Perhaps it may be well to state also the vacant or but sparsely settled frontier sections. They were as follows: A somewhat narrow section between Gananoque and Kingston; the Lake Ontario region from Trenton to Hamilton; the central portion of the Lake Erie section.

As the population extended and grew, both by the large natural increase peculiar to those early days, and also by the coming in of those who are sometimes called the later loyalists, as well as by the coming of some who had fought on the side of the Revolutionists, it was natural that there should arise a desire that this western part of Quebec be separated from the older portion of the province, where French laws and methods prevailed. Without stopping to discuss the agitation that soon sprang up over this question, we came down to the passing of the Constitutional Act of 1791, providing for the division of Quebec. On the 18th of November of that year, Lieut.-Governor Alured Clarke issued his proclamation, fixing the boundary line between Upper and Lower Canada to take effect on the 26th December, 1791. Lieut.-Col. John Graves Simcoe arrived early in the new year to take his office as Lieut.-Governor of Upper Canada.

The Constitutional Act provided that the Parliament should consist of two bodies, a Legislative Council to consist of not fewer than seven members appointed by the Crown, and a Legislative Assembly to consist of not less than sixteen members elected by the people. The following, therefore, would be a statement of the governing bodies of the country:—

The Governor-General of Canada (Lord Dorchester).

The Lieut.-Governor of Upper Canada (Lt.-Col. Simcoe).

The Executive Council (the executive, corresponding to a cabinet of ministers in these days, all appointed by the Crown).

The Legislative Council (corresponding to our Senate).

The Legislative Assembly (the elected representatives of the people).

Lord Dorchester had sent home a list of persons suitable for the Executive Council from which a selection had been made. We are told that Simcoe was delayed some months at Quebec awaiting a quorum of his new advisers, with whose assistance he wished to decide upon the basis of representation in the new Legislature. While at Quebec (Feb.

7th, 1791,) he issued a proclamation as to the conditions of sale of Crown Lands. Beyond this we have as yet little or no record as to his doings while at Quebec. Probably he was renewing acquaintances with some of his old associates of the Queen's Rangers, and gathering information as to his new province.

With the early summer he started westward, and on July 8th, reached Fort Frontenac or Kingston. After the swearing in of the following members of his Executive Council he began formal deliberations:—

William Osgoode	sworn	in	9th	July,	1792.
James Baby	"	"	9th	"	1792.
Peter Russell	"	"	9th	"	1792.
Alexander Grant	"	"	11th	"	1792.

William Robertson had been selected as a member, but he does not appear to have been sworn in or to have taken his seat. Trying to make up for lost time, the Council met even on Sundays, and after 8 days' deliberation the proclamation of July 16th, was put forth. This proclamation dealt with two things: First, it divided the province into 19 counties; second, it provided for the selection of 16 members of the Legislature by the residents of these 19 counties.

The following notes of procedure are to be found in the Archives of Canada for 1891. They supply some interesting information as to how the work proceeded:—

> Minutes of meetings at Kingston, 8th July, 1792.—Proclamation that Dorchester is appointed Governor-General of Upper and Lower Canada, and Simcoe Lieutenant-Governor of Upper Canada read and Simcoe takes the prescribed oaths.
>
> Minutes, 9th July.—Executive Councillors Osgoode, Baby and Russell take the oaths and their seats. Littlehales, appointed Clerk of the Council, and Jarvis, the Secretary of the Council, take the oaths. Instructions read (embodied in minutes in full).
>
> Proclamation ordered for continuing judges and other civil officers in their employments.
>
> Minutes, 10th July.—Militia returns laid before the Council, which proceeded to divide the Province into counties to provide for representation.
>
> Minutes, 11th July.—Grant took the oaths and his seat as a member of the Executive Council. The division of the Province resumed.
>
> Minutes, 12th July.—Division of the Province continued.
>
> Minutes, 13th July.—Same business resumed.
>
> Minutes, 14th July.—Division resumed.
>
> Minutes, Sunday, 15th July.—Division concluded; proclamation to bring it into effect ordered; as also a proclamation to call together a legislature.

Minutes, 16th July.—Writs of summons to the Legislative Council issued to the following: William Osgoode, Chief Justice; James Baby, Richard Duncan, William Robertson, Robert Hamilton, Richard Cartwright, Jr., John Munro, Alexander Grant, Peter Russell.

Edward Burns took the oath as Clerk of the Crown, and Richard Pollard and Alexander McDonell took the oaths as Sheriffs.

Minutes, 21st July.—Additional proclamation issued respecting the continuation of civil officers in judicial and ministerial employments.

This proclamation was issued before a printing press was established in Upper Canada. I understand that it was sent to Montreal to be printed, and a copy of it is to be found in the department of the Secretary of State at Ottawa. Two points in connection with it may be mentioned. In the Quebec Gazette of the 9th August, 1792, appears the following news item:

> "Letters Patent dated the 9th of July have been issued by His Excellency Lieutenant-Governor Simcoe, dividing the Province of Upper Canada into counties, etc., and apportioning the representation thereof. The following are the names of the Counties, with the number of representatives they send to the House of Assembly, viz.: Glengarry, 2; Stormont, 1; Dundas, 1; Grenville, 1; Leeds and Frontenac, 1; Ontario and Addington, 1; Prince Edward, 1; Lenox, Hastings and Northumberland, 1; Durham and York, 1; Lincoln, 1; Norfolk, 1; Suffolk and Essex, 1; Kent, 2; making in the whole 19 counties and 15 representatives."

The question at once arises as to how the official organ at Quebec made the mistake in reporting the decision of the Lt.-Governor and Council. It appeared one month after the decision of the Executive. Does it represent the views of Simcoe before he left Quebec, which views were changed after discussing the situation with the Upper Canada Councillors? Was it the Council's first draft, or was it merely a news item sent down by some correspondent who was not exact in his statements?

The second point is that the proclamation must have been scarce and not readily available. The first time it appears in the Journal of the Legislature is on the 31st December, 1821, where it was placed on record by resolution of the House. It does not appear in the earliest printed collection of Statutes, but it is to be found for the first time, and, I am of opinion, for the only time in available form, in the volume of Statutes issued at Kingston in 1831, by Thompson and MacFarlane.

Now let us give a list of the counties beginning at the extreme west:—

Kent, Essex, Suffolk, Norfolk, Lincoln, York, Durham, Northumberland, Hastings, Prince Edward, Lennox, Addington, Ontario, Frontenac, Leeds, Grenville, Dundas, Stormont, Glengarry.

The nineteen counties may be arranged in two groups, the first consisting of eight, the second of eleven. The first eight, Kent to Northumberland, in the order given, are also the names of the eight eastern counties of England; the townships making up these eight counties were named after important towns in the similar counties of England. Thus Newark, the name then given to the township and the settlement in which the Legislature was to be convened, was so-called after the town of Newark in Lincolnshire.

The next question that presents itself for our consideration is, who were the men selected by our people as their representatives, and what ridings did they represent? This election took place only 110 years ago; it was the first legislature of the province that was to be formed. One would think that it would be easy to turn up some record that would give us this information, but I could not find it, and I decided to try to work out the answer to this question, and this paper is the result. It will, I think, be admitted that we should if possible, determine who were the first representatives and whom they represented. Every printed record that I have found is either incomplete or incorrect. The writers of our history have told us what these men did, but they have told us very little as to who they were. The first printed list that I have found in our historical works is contained in Dr. Canniff's Settlement of Upper Canada, published in 1869, and the writers since have copied it in its incomplete or only partially correct form. It would take too much space to recount the interesting search that has been made for the facts that are to follow.

To show further what meagre material we have to work on, it may be stated that the first legislature held five sessions as follows, at Newark or Niagara:—

1st	session,	17th September	to	15th October,	1792.
2nd	"	31st May	to	9th July,	1793.
3rd	"	2nd June	to	9th July,	1794.
4th	"	6th July	to	10th August,	1795.
5th	"	16th May	to	3rd June,	1796.

Of these five sessions we have very condensed typewritten reports or journals of the 1st and 2nd. There is no record available here or in England of the 3rd, 4th and 5th. What became of the reports sent home by Simcoe? The journals of the Legislative Council are missing for the same years as those of the Assembly, and the surmise has been offered that the vessels carrying these records may have been captured by French corsairs, in which case search in the archives of Paris might bring interesting results. It may be that some day they will be resurrected from their long sleep in some dusty pigeon hole in old London.

Glengarry.— This county then included the present county of Glengarry, and also the land north to the Ottawa in the county of Prescott. The first riding included the township of Charlottenburg (formerly called No. 1), and the second riding comprehended the rest of the county. The latter therefore would include the few settlers in Lancaster and those residing in the rear of the county as far as the Ottawa River. The two members selected were the brothers, John Macdonell and Hugh Macdonell.

The Macdonells of Aberchalder came out to America at the solicitation of Sir William Johnson and received grants of lands in the Mohawk Valley. Alexander Macdonell, the father, had been an aide-de-camp to Prince Charles Stuart in 1745. Sir John Johnson raised in New York the celebrated body of Loyalist soldiers known as the King's Royal Regiment of New York (Johnson's Royal Greens), Alexander Macdonell became captain of the first battalion of this regiment. His brother also was an officer in the regiment. Their sons followed in their fathers' footsteps and enlisted in the same regiment, in the Royal Highland Emigrant Regiment, and in Butler's Rangers.

John Macdonell, after serving as lieutenant in the 84th, or Royal Highland Emigrant Regiment, was, for five years and ten months captain in Butler's Rangers. When the Royal Canadian Volunteer Regiment of Foot was organized in Canada in 1796, John Macdonell was appointed lieutenant-colonel of the 2nd battalion. This was the first corps raised in Upper Canada. The first battalion was raised in Lower Canada under Lieutenant-Colonel de Longueuil and Major Louis de Salaberry.

The younger brother, Hugh Macdonell, was lieutenant in the 1st Battalion of the King's Royal Regiment of New York, and served in that corps for seven years. When the R. C. Volunteers were organized, Hugh Macdonell commanded a company under his brother, Col. John. He was shortly after appointed captain in the 2nd Battalion, and in 1803, was Lieutenant-Colonel of the Glengarry Militia Regiment, of which John was Colonel. Mr. J. A. Macdonell states that " he was appointed by Lieutenant-Governor Simcoe to be First Adjutant-General of Militia in Upper Canada, and was the founder of our militia system." The two brothers settled in Glengarry along with the other Scottish soldiers, and were selected as the representatives of that county. Mr. J. A. Macdonell, in his book on Glengarry, states that Hugh was member for the First Riding. His name appears frequently in connection with the surveys and settlement of the first townships in his section.

John Macdonell was chosen Speaker of the Legislature when it met in session at Newark in September, 1792. He continued as a member for Glengarry in the second legislature, 1796-1800, but his brother Hugh was succeeded by Captain Wilkinson. Hugh Macdonell was in 1805 appointed Assistant Commissary-General at Gibraltar, through the recommendation of H.R.H. the Duke of Kent, and later (1811 to 1820), Consul-General at Algiers. Sir Alexander Macdonell and Sir Hugh Guion Macdonell, who have both won distinguished honour in the Imperial service, are his sons.

Lieutenant-Colonel Chichester Macdonell was a brother of the two members. After serving as lieutenant in Butler's Rangers he followed the British service abroad, was under Sir John Moore at Corunna, and died in India, leaving behind a worthy record.

But the relationship of this family to our early legislatures is not yet all told, for a sister of the three brothers was married to Alexander Macdonell of Greenfield, and two of their sons represented Glengarry in the Legislature of Upper Canada, Lieutenant-Colonel Macdonell, who fell with Brock at Queenston Heights, and Lieutenant-Colonel Donald Greenfield Macdonell.

Before passing on to the next riding, it may be worth calling attention to the fact that the first Speaker of the first Legislature of Upper Canada was a Roman Catholic, for at that time such a selection could not have taken place in the Legislature of Nova Scotia. The date of his death is uncertain, but he died at Quebec, and his remains lie buried under the Roman Catholic cathedral of that city.

Stormont.— This county consisted of the townships of Cornwall and Osnabruck and all north to the Ottawa River. One member was to be selected and the man first chosen was Lieutenant Jeremiah French, who had served seven years in the 2nd Battalion of the King's Royal Regiment of New York. The French family are supposed to have come from Manchester, England. They settled in Vermont and occupied a farm whereon Manchester, Vermont, now stands. There were two brothers, Jeremiah and Gershom. On the breaking out of the war, they enlisted as loyalists. Jeremiah French appears to have been a man of importance in Vermont; he had a large holding of land and was at one time High Sheriff at Manchester. His wife (Elizabeth Wheeler) was true to British rule, and after her husband departed for Albany, it was considered advisable by the Revolutionists to expel her from the State on account of her outspoken loyalty. Jeremiah French's property had been seized by the State, and now part of the chattels were sold to pay for her transportation. Then with a few belongings she was taken to the frontier and sent on to the British camp.

Gershom French, the brother of the member, lived at Coteau Landing, and under direction of the Governor, made some exploration of the country between Kingston and Ottawa.

Lieutenant Jeremiah French drew lands in Cornwall and in Montague. He was an intimate friend of Bishop Strachan. Benjamin French, son of Jeremiah, and Dr. Strachan, were married to sisters, daughters of Dr. Wood, an English army surgeon. We shall close our account of Lieutenant French by referring to the sad accident that happened while he was entertaining the Duke of Kent: A turkey shoot was in progress, and just as Mr. French was about to fire, his daughter crossed in front, and was shot dead upon the spot. His successor was Robert I. D. Gray, who was drowned in 1804 in the lamentable shipwreck of *The Speedy* off Presqu'isle.

Lieutenant French died in 1805, and was survived several years by his widow.

(For these particulars I am indebted to his descendant, F. J. French, Esq., K.C., of Prescott.)

Dundas.— This county consisted of Williamsburgh and Matilda townships, and all lying to the north as far as the Ottawa. The member chosen was Alexander Campbell. Of this member we know but little. Croil, in his History of Dundas, says, that he left behind him an unenviable reputation for veracity, but whether this was merely in the political sense or not, we do not know. He appears to have left the riding and moved to Montreal. His name does not appear in the list of members published in the Quebec Almanac for 1796. This list, of course, must have been made up and printed in 1795, before the expiration of the first legislature. He was present, however, at the first and second sessions. His successor in the second legislature was Colonel Thomas Fraser, of Matilda.

Grenville.— This county was composed of the townships of Edwardsburgh and Augusta, and the lands to the north as far as the Ottawa River. The western part of Carleton and the south-eastern part of Lanark therefore were then included in Grenville, but practically all the settlers were in the two front townships. Ephraim Jones was chosen as member for Grenville. At the same time he was a member of the Land Board for Leeds and Grenville. Josiah Jones came to Boston in 1665 and settled at Weston, Mass., where he died in 1714. His grandson, Elisha Jones, had a numerous family, fourteen sons and one daughter. The family records have it that all these children came to British territory at the time of the Revolutionary War, some settling in New Brunswick and in Nova Scotia.

and some in Upper Canada. Ephraim was the tenth son. He settled in Augusta township, where he was long known as "Commissary Jones," through his having charge of the Government stores. He married a Miss Coursoll, of Montreal, and had four sons and four daughters as follows:

1. Charles, born 1781, was a miller and merchant, and began the settlement at Brockville, where he died in 1840. He was member for Leeds from 1820 to 1828, and was afterwards appointed a member of the Legislative Council.
2. William owned mills at Beverley (now Delta). He died at Brockville in 1832.
3. Jonas, a pupil of Dr. Strachan, studied law, was appointed Judge, and in 1837 was made Judge of the Queen's Bench. He died at Toronto, in 1848. His eldest son, David Ford Jones, was member for Grenville for three terms, 1816-1828, and again chosen in 1836.
4. Alpheus was Collector of Customs and Postmaster at Prescott, where he died in 1863.
5. Charlotte married L. P. Sherwood, afterwards Judge of the Queen's Bench.
6. Sophia married Andrew Stuart.
7. Lucy married Dr. Hubbell, of Brockville.
8. Eliza married H. J. Boulton, of Toronto, at one time Governor of Newfoundland.

Ephraim Jones was succeeded as member in 1786 by Dr. Solomon Jones who had been a surgeon in Burgoyne's Army, and who also had settled in Augusta. There were two well known but unrelated families of the name of Jones in Grenville county. Solomon was one of four brothers — Daniel, Solomon, David and John — who came to Upper Canada from Fort Edward, New York. Two other brothers were killed in the war, and a seventh settled in Nova Scotia. Daniel was, along with Charles Jones, son of Ephraim, one of the founders of Brockville. He was the father of Daniel Jones, who was knighted. His other son, David Jones, was member for Leeds, and was appointed registrar and judge. David Jones, brother of Solomon, was the prospective husband of Jane McCrea, who was murdered by the Indians in northern New York, and whose death played an important part in the Revolutionary War.

(For most of these facts in regard to the Jones family I am indebted to Leavitt's "History of Leeds and Grenville.")

Leeds and Frontenac counties included the townships at present contained therein, together with all the land north to the Ottawa River. These two together were entitled to one member. The reason for this will be evident by recalling what was stated before as to the vacant land between Kingston and Gananoque. John White was selected as the first member. He came out from England in 1792, probably along with Simcoe, who appointed him Attorney-General. That he represented Leeds and Frontenac we know from one of Simcoe's letters, an extract from which appears in the Archives of Canada for 1891, p. xxii., as follows:—

> "In my passage from Montreal to Kingston, I understood that the general spirit of the country was against the election of half-pay officers into the Assembly, and that the prejudice ran in favour of men of a lower order, who kept but one table, that is, who dined in common with their servants. It was by great good fortune that the temporary residence I made at Kingston created sufficient influence to enable us to bring the Attorney-General, Mr. White, into the House."

Mr. White was succeeded in the Legislature, in 1796, by Captain Jessup. He was shot in a duel with Mr. Small, clerk of the Executive Council, on January 3rd, 1800, and died the following day.

Addington and Ontario.— Addington included Ernestown or township No. 2, and all the land north to the Ottawa. Ontario was an island county consisting of Amherst, Gage, Wolfe, Howe and all other islands east to the Gananoque River. The remainder of the thousand islands east of the Gananoque River were attached to the several counties in front of which they were situated. It might be mentioned here that Amherst Island formed part of the estate of Sir John Johnson. Addington and Ontario were entitled to one member, and Mr. Joshua Booth was selected.

Joshua Booth's early history is, like that of most early settlers of Upper Canada, largely of a traditionary nature. His ancestors were English and were settled in Orange County, New York. At the outbreak of the Revolutionary War the family divided, Joshua taking the British or Loyalist side. (On the U. E. L. list he was reported as a sergeant.) He settled in Ernestown and shortly afterward became proprietor of the King's Mill, situated west of Kingston, on what is now known as Mill Creek. There is a story that after the war, his mother came from New York State by the Champlain and St. Lawrence to visit him. She was accompanied by negro slaves and her object was to convey to him a bag of gold, doubtless the result of some family division of property. During the war of 1812, Joshua Booth and his two sons saw service, the father as captain. The mother when condoled with for the absence of her two sons, flashed out: "Indeed. and I wish I had more to send." This Spartan mother was Margaret Fraser, daughter of Daniel Fraser, U. E. L.

Joshua Booth's death was tragic. Though a soldier and a fighter, the sight of blood overcame him. During an engagement he was thrown into a state of catalepsy, and died on October 31st, 1813, from loss of blood; or, as some assert, he was by mistake buried alive in the hurry of the affray. He was survived by his widow and ten children.

In 1796 Joshua Booth was succeeded as representative by Christopher Robinson, who died November 2nd, 1798. William Fairfield, of Bath, was chosen in June, 1800, to complete the unexpired term (two sessions). The latter was the grandfather of the wife of Marshall Spring Bidwell.

Lenox, Hastings and Northumberland.—The county of Lenox (this is the original spelling) included the present townships of North Fredericksburg, South Fredericksburg, Adolphustown and Richmond, Hastings included all the townships in the present county, together with all the land lying north as far as the Ottawa, and the small islands in the bay and river Trent lying nearest to it. Northumberland included the townships in the present county as far north as the Mississaga Indian lands. The settlers in 1792, were located principally in the townships on the bay. The proclamation provided that these three counties, with Adolphustown excepted, should together elect one member. The man chosen was Lieutenant Hazleton Spencer. He was the eldest son of Benjamin Spencer, and was born at East Grenville, Rhode Island, on 29th August, 1757. About ten years later the family moved to a grant of land on the Winooskie River, Vermont. The father was elected a member of the Provisional Assembly or Congress to decide the course of the State in connection with the revolutionary troubles. He stood out for British rule, and, consequently, had to flee. He joined Burgoyne's Army, was present at the battle of Bennington, and died shortly after at Ticonderoga. Hazleton Spencer, the son, joined the King's Royal Regiment of New York, and was at one time a prisoner with the rebels. He was made lieutenant in the 2nd battalion and on the disbanding of the regiment settled on a tract of land in Fredericksburg, on the bay shore near Conway.

He was married to Miss Margaret Richards. There were born six sons and three daughters, the baptisms of which appear in the Langhorn Registers, published by the Ontario Historical Society (Papers and Records, Volume I, 1899).

The late Rev. Canon Spencer, through whom this information was procured, was the son of Dr. Benjamin Conger Spencer, the eldest son of Lieut. Hazelton Spencer.

When the second Battalion of the R. C. Volunteers of Foot was raised by Colonel John Macdonell, Hazelton Spencer was appointed

Major. From 1797 to 1803, he was commandant of the garrison at Kingston, and, it is said, was a great personal friend of Dr. Strachan, with whom he was wont to hold lengthy heated discussions. He was the County Lieutenant of Lennox, and was actively preparing for the war with the United States when he died suddenly in February, 1813. He was buried with military honours on his own farm. Lieutenant Spencer was an ardent supporter and upholder of the Anglican Church.

Prince Edward and Adolphustown.—The county of Prince Edward was of the same extent as it is to-day. It was divided into three townships—Marysburgh (No. 5), Sophiasburgh (No. 6) and Ameliasburgh (No. 7). These townships contained the overflow from across the bay of Sir John Johnson's soldiers. Here also (in Marysburgh) were located the little band of Hessians, and in these townships some of the officers drew large areas of land. Among others may be mentioned Major James Rogers, Major Peter Vanalstine and Captain Archibald McDonell. To make the representation fair, Adolphustown was detached from Lennox and added to Prince Edward. Though separated by the Bay, it should be remembered that the main road to York passed through Adolphustown and crossed at the point by ferry to Prince Edward County shore, whence it ran on to the carrying place.

Adolphustown was one of the most important townships of the Bay district. Though small and divided into two parts by Hay Bay, it possessed an importance beyond its size or population. It was here that the Loyalists landed and from it the settlement spread to adjoining townships. In it was a band of Quakers or Friends from Dutchess County, New York, many of whom had been fighters on the British side. Major Peter Vanalstine was the leader of the soldier settlers, and Philip Dorland was the leading Quaker. The selection of Philip Dorland as member took place, and in September he started for the meeting in Newark. But there was a difficulty in the way. To take his seat he must first take the prescribed oath. This he could not do as a Quaker. This matter came up for consideration immediately after Colonel Macdonell had been elected speaker. A statement of the case, signed by Dorland, was presented, and the House at once decided that the seat be declared vacant, and a new election held. When the people met once more to consider the situation they selected Major Peter Vanalstine as their representative, and he appeared and took his seat at the second session.

In Dr. Canniff's settlement of Upper Canada, it is stated that Peter Vanalstine was major only by courtesy and that he came as a non-combatant at the head of a party of non-combatant farmer Loyalists to settle this beautiful little township. This statement has been repeated again and again, but it is incorrect. Through the courtesy of Rev. W. O. Raymond of St. John,,N.B., I have been permitted to examine a muster roll of batteau men organized and directed by Captain Peter Vanalstine, and in his evidence before the Claims Commission, Vanalstine refers to his military service. Major Vanalstine was of Dutch ancestry, he came from near Albany, New York, and spoke English with quite a foreign accent. After living for some years in Adolphustown he moved across the bay to Prince Edward, where he had large holdings of land and started the mill at the most picturesque spot of the Bay district, the lake on the mountain. He returned to Adolphustown and died at his old home in 1811. He was succeeded in 1796, by David McGregor Rogers, the son of Major James Rogers, and the nephew of the celebrated ranger, Robert Rogers. David McGregor Rogers was at the time living on a large military land grant at West Lake. David McGregor Rogers sat in the Legislature of Upper Canada from this time until his death in 1824, with the exception of one Parliament. His record, therefore, was for 24 years, the longest of any member of the Upper Canada House of Assembly. Reference to the Rogers family may be found in a paper printed in the transactions of the Royal Society of Canada, 1900. "Rogers, Ranger and Loyalist," by Walter Rogers.

Durham, York and 1st Lincoln.—The County of Durham extended from Northumberland west to the end of Long Beach in Darlington township, and north as far as the Mississaga Tract. It represented very nearly the county of the present day. York consisted of two ridings or parts: The east, including the present counties of York and Ontario; and the west, the northern half of Wentworth County. Between these two lay an Indian Reserve, now forming the counties of Halton and Peel. The county of Lincoln comprehended the Niagara Peninsula, and included Ancaster, Barton, Saltfleet, Glanford and Binbrook townships of the present county of Wentworth, together with the present counties of Lincoln and Welland. Lincoln was divided into four ridings. The first riding consisted of the following townships:—Ancaster Barton, Saltfleet, Glanford, Binbrook, Caistor, Gainsboro, Grimsby and Clinton. Durham, York and 1st Lincoln were to elect one member who would, therefore, represent the settlers on Lake Ontario from Port Hope to a little beyond Beamsville. The great bulk of the settlers were around the head of the lake from Hamilton southeast. The man selected was Nathaniel Pettit, of Grimsby. He had been a member of the Land Board of Nassau since 1788, and his name was one of the list sent home by Lord Dorchester from which to select the Legislative Council. Jonathan and Deborah Pettit lived in the State of Pennsylvania. Part of their land was in New Jersey. There were two sons, Andrew and Nathaniel. Andrew married Sarah Smith in 1780, and in 1787, with wife and four children started for British territory. They crossed the Niagara in July, and within two weeks erected their log house on lot 15, Grimsby township. Andrew Pettit died 12th March, 1819. He is the ancestor of the Pettits of that section. His brother Nathaniel lived on a farm between Grimsby and Beamsville. He owned the land on which Grimsby now stands. Nathaniel Pettit owned lot No. 9 in the first and lot No. 9 in the second concession; Andrew Pettit owned lot No. 15 in the first and second concessions and the broken front; and John Pettit owned lot 12 on the front and in the first and second concessions. Grimsby village is situated on lot 9 in the first concession, and lots 9 and 10 in the second concession.

Nathaniel Pettit was commonly known as Judge Pettit. He never married. Some descendants of his brother are of opinion that he returned to New Jersey; others think that he died and was buried on his own farm on the lake front. He was succeeded in 1796, as member, by Richard Beasley.

The Second Riding of Lincoln was given one member. This riding consisted of the following townships:—Louth, Grantham and Newark, the three northwestern townships of the present county of Lincoln. Benjamin Pawling of Grantham township was a member of the first Legislature and as he lived in the second riding, it is a fair surmise that he was its representative.

Benjamin and Jesse Pawling were brothers, sons of a Welshman who had settled in Pennsylvania. At the outbreak of the Revolutionary War they refused to take up arms against the British, and their property was confiscated or burned. Driven out, they made their way to Nova Scotia, whence by walking and canoeing they reached Quebec. Here they enlisted and fought till peace was proclaimed. Benjamin was a Captain-Lieutenant in Butler's Rangers, and at the close of the war was advanced to be a Colonel. He was reported at Detroit about 1784, evidently intending to settle there, but he left for Niagara and drew land on the lake front immediately east of Port Dalhousie. Jesse's land was to the west of this. Benjamin was employed as a surveyor in the early days and was appointed a member of the first Land Board of Nassau in 1788. His oldest son Henry was a Captain of Militia during the war of 1812-14, and was a trusted carrier of despatches between Niagara and Detroit. He was present at the battles of Stoney Creek and Lundy's Lane. Henry Pawling's daughter married William Pay who is still living at St. Catharines, and who remembers the destruction of the Caroline, for he stood sentry on the Canadian side as she went over the Falls. There are descendants also of Jesse Pawling, the elder brother of Benjamin, still living in the Niagara Peninsula.

According to the Niagara records, Colonel Benjamin Pawling, of Twelve Mile Creek, was buried on 16th December, 1818, by Rev. Mr. Addison of St. Andrews Church, Niagara.

Samuel Street was elected in 1796, as a member of the second Legislature, and I am inclined to place him as the representative of 2nd Lincoln.

The Third Riding of Lincoln was given one member. This riding consisted of the following townships which now form part of Welland County:—Stamford, Thorold and Pelham. Isaac Swayzie was a member for one of the Lincolns, and I am disposed to place him in the 3rd, in which he lived. If not member for the 3rd, he must have been member for the 4th. Strange to say I have found the greatest difficulty in placing the members who represented the ridings adjacent to Newark, and in obtaining personal notes as to them. In Lord Dorchester's list, Isaac Swayzie is entered as "Pilot to the New York Army." He is referred to by some as a noted scout, and this whets our desire to know something of his interesting early career. He lived in Thorold township and held a position as a Magistrate of the Home District. He had a son, Richard Swayzie, who was born at Elizabeth, New Jersey, in 1775, whose daughter married a Mr. Church. In Vol. I., page 616, of Mr. John Ross Robertson's "History of Freemasonry in Canada," I find this reference:—

> "Brother Isaac Swazie and Brother Parshall Terry had the monopoly of contracts for the supply of the fort at York. Brother Swazie was originally a member of Lodge No. 7, New Jersey, and was initiated in 1776, receiving his E.A. and F.C. in the United States, and affiliating as an F.C., was raised to the sublime degree of a M.M. in 1801 in Lodge No. 2 at Niagara."

One other item may be credited to him, and that is that the old well-known apple, Swayzie Pomme Gris, was originated on his farm. He was not a member of the second Legislature, but sat in succeeding Houses as follows:—

3rd Parliament, 1801 to 1804, for 2nd, 3rd and 4th Lincoln, along with Ralfe Clench.
4th Parliament, 1805 to 1808, for 2nd, 3rd and 4th Lincoln.
6th Parliament, 1813 to 1816, for 4th Lincoln.

The old Niagara church records published in Vol. III., of the "Paper and Records of the Ontario Historical Society," contain some Swayzie items. There are baptisms of the children of Isaac and Eleanor Swayzie, one of whom, Wm. Dickson Swayzie, was married on 3rd of March, 1830, to Mary Durham. Mrs. Mary Durham Swayzie is still living in New York at the fine old age of 93. She remembers the British officers stopping at her father's home on the North River Road toward the close of the war. She says Isaac Swayzie died on his farm about two miles from Niagara. According to the records he appears to have been married twice, first to Sarah Secord (daughter Catherine, born 13th March, 1793,) and afterward by Rev. Wm. Addison, on the 18th of September, 1806, to Lena Ferris (widow).

The Fourth Riding of Lincoln and Norfolk were together allowed one member. The fourth Lincoln consisted of the following townships: — Willoughbly, Crowland, Bertie, Humberston and Wainfleet, Norfolk County extended west from Lincoln and the west riding of York as far as the River Barbue or Orwell (now called Catfish Creek). The northern boundary was the Thames, and Lake Erie of course formed the southern limit. Norfolk, therefore, included all of Haldimand and part of Elgin, also parts of Brant, Oxford and Middlesex. Most of Haldimand was Indian lands. The settled portion consisted mainly of the townships of Welland County, named as the 4th Lincoln, with Fort Erie as headquarters. Who was the member elected ? We are certain that Pettit, Pawling and Swayzie were three of the Lincoln members, for their names appear in the journals of the first and second sessions, but who was the fourth ? That is the question that has puzzled me and I am compelled to state that I cannot answer the question satisfactorily. Dr. Canniff, in his list has a name as follows "— Young," but he gives no riding for any member. No such name appears in the journals, which mention only fifteen names in all. Through the kindness of Mr. Phileas Gagnon I had the Quebec almanacs searched and find the following list in that for 1796, without mention of any constituencies:

HOUSE OF ASSEMBLY OF UPPER CANADA.

John McDonnell, Esq., Speaker.

Nanthanial Pettit.
Isaac Swayze.
Hazleton Spencer.
Ephraim Jones.
Joshua Booth.
Peter Vanalstyne.

Benjamin Pawling.
David Wm. Smith.
John White.
Jeremiah French.
Francis Baby.
Pashal Tarry.
Hugh McDonell.

Angus McDonell, Esq., Clerk.

The list of fourteen names supplied a new name which should read I have no doubt "Parshall Terry." It suggests a number of questions. Why only fourteen ? Why the new name of Terry ? As referred to before he was associated with Swayzie in the supplies for the fort at York. After the removal of the Government to York, he appears to have taken up his residence there and to have conducted a milling business in the valley of the Don. Was Young first elected and then for some reason or other compelled to drop out? The journals might tell us, but those of the 3rd, 4th and 5th sessions are lacking. If we accept the almanac list, Terry was the member in 1795. Who was the ——— Young? There were several of that name in the Niagara district. There were two John Young's, both associated with St. Andrew's Church at Niagara. One was a merchant and had holdings of land opposite. Youngstown was named after him. He was drowned in Lake Ontario while returning from Montreal on 29th July, 1840. A tablet in St. Andrew's Church, Niagara, states that he was 73 years of age at the time of his death. If he were the member, he would have been only 25 years of age when elected. There was also a Peter Young, a merchant at Vittoria in the early days.

Suffolk and Essex counties were together to have one representative. Suffolk had a frontage on Lake Erie from Catfish Creek to Point of Pines and extended back to the Thames. It, therefore, included the western part of Elgin county, and the eastern part of Kent county, as these at present are constituted. Essex took in the rest of the country westward to the Detroit, and included all of Essex and the remainder of Kent county, except a strip four miles wide that was marked off by a line running from Maisonville's mill on the Detroit east to the Thames. The settlers were mainly in "the two connected townships," Gosfield and Colchester, and along the Detroit River toward the present town of Sandwich. Who was the member for Suffolk and Essex? In most of the lists given, the name is Mr. Baby, and some writers have conjectured that it was Mr. James Baby. Referring to the Quebec Almanac list we find that it was Francis Baby. In only one historical work have I seen the name correctly given and that is in Dean Harris' "History of the Roman Catholic Church in the Niagara Peninsula," wherein he states that there were three members of the Roman Catholic Church in the first Legislature, namely, the two Macdonnells from Glengarry and Francis Baby. James Baby had been appointed one of the first members of the Legislative Council on the 16th July, therefore, it could not have been he. I think we may set it down as settled that the member was Francis Baby, who lived on the east side of the Detroit River in, or on the borders of, the present town of Sandwich. I have seen the statement that when General Hull invaded Canada, he established his headquarters in the partially completed house of Francis Baby.

The Baby family was prominent in the west. When Quebec was taken in 1759, and Montreal capitulated in 1760, Major Rogers was sent by General Amherst to proceed westward and take over the posts of Michigan. The negotiations between Rogers and Bellestre, Commander of Detroit, were carried on through M. Babee for the French and M. Brehme for the British. This was doubtless Jacques Duperon Baby, the son of Raymond Baby and grandson of Jacques Baby de Rainville, who came to Canada from Guienne, France, with the Carignan Regiment. Duperon Baby was appointed in 1788, a Justice of the Court of Common Pleas for Hesse, being associated with Alexander McKee and William Robertson. He was born in 1738, and died at Sandwich in 1796. He was the only French-Canadian fur merchant at Detroit. On the 20th November, 1760, he married Mlle. Suzanne de la Croix Reaume. There were eleven children, seven sons and four daughters. The four daughters married Caldwell, Thomas Allison, Ross Lerin and Bellingham (afterwards Lord Bellingham). Daniel, Antoine and Louis entered the British Army; Pierre studied medicine in Edinburgh, and returned to practise in Upper Canada; Jean Baptiste was one of the members for Kent in the fifth Parliament (1809-12). William L. was another son. Jacques, or James, the eldest of the family, was educated at Quebec and in Europe, was made a Judge of the Court of Common Pleas and an Executive Councillor.

Francis Dufresne Baby, member of the Executive Council of Quebec, was a younger brother of Jacques Duperon Baby.

The children of Honourable James Baby, and Eliza Abbot were as follows:—Jacques, a lawyer of Toronto; Raymond, sheriff of Kent; Charles and William of Sandwich; and Eliza who married Hon. Charles Casgrain, son of Pierre Casgrain, Seigneur de la Bouteillerie. Thérèse Baby, daughter of Jacques Duperon Baby, married (1) John Cassidy, (2) Thomas Allison. Her daughter, Susanne Allison, married Philippe Aubert de Gaspé.

The successor of Francis Baby in the representation of Suffolk and Essex in 1796, in the 2nd Parliament, was John Cornwall of Colchester.

Kent county was granted two representatives. It included everything left over from the other eighteen counties. The following is the description in the proclamation:—

> "Which County is to comprehend all the country not being territories of the Indians, not already included in the several counties hereinbefore described, extending northward to the boundary line of Hudson's Bay, including all the territory to the westward and southward of the said line to the utmost extent of the country commonly called or known by the name of Canada."

This was a large county, surely, but the voters were included in a strip four miles wide along the south shore of Lake St. Clair, and in the town of Detroit.

The two members chosen were William Macomb and David William Smith. They were or had been residents of Detroit, at which place no doubt the election took place (27th August, 1792).

John Macomb was a North of Ireland man. His home was at Dunturkey, county Antrim. He married Jane Gordon of the Scottish House of Gordon. He established the first line of sailing vessels between Belfast and New York. Coming out to America about 1750, he settled for a time at Albany, where he was appointed a magistrate. He engaged in the business of furnishing supplies for the British posts from Montreal to Detroit, and for nearly half a century the name of Macomb occurs in connection with the trade of the lakes and St. Lawrence. He had three children, Alexander, William and Ann. The two brothers followed their father's business and as partners had their headquarters at Detroit. Alexander married Catherine Navarre, daughter of Robert Navarre. She was born at Detroit in 1757, and died in New York in 1789. This Alexander was born at Belfast in 1748. He was the man interested in the Macomb purchase along the St. Lawrence in northern New York, though it is claimed that his brother William provided some of the funds. Alexander was the father of Alexander Macomb, a United States general in the war of 1812. He defeated Prevost in the battle of Plattsburg (11th September, 1814). From 1828 to 1841 he was Commander-in-Chief of the United States Army. Born at Detroit on 13th April, 1782, he died at Washington, D.C., 25th June, 1841. A monument to his memory is being erected at Detroit.

Ann Macomb was born in Ireland, 1753. She married (1) Colonel Francis Von Phister, who was killed at Bennington, 1777; (2) Thomas Bennett, of Detroit, in 1782.

William, the member, was perhaps the largest land owner at Detroit, being the possessor of most of the American islands in the river, and also of a large farm (the Cass farm) now in the very heart of the finest residential portion of the city. He married (1) Sarah Jane Dring, daughter of General Dring, and (2) Miss Gallant (a Huguenot). After his death his widow married Captain Betton, Commander of the King's forces on the lakes. She died in New York in 1846. William had eleven children, eight of whom were living at the time of his death. He died in 1796, just about the time that Detroit was evacuated. His will, dated 11th April, 1796, is on register at Sandwich. In it he mentions his father, so that it is probable the latter survived his son. Whether he died at Sandwich or at Detroit is uncertain, but the family tradition is that he died at Detroit, was buried there in old St. Paul's Churchyard, Woodward Avenue, which is now covered with stores. His surviving children were John W., William, David, Ann, Catherine, Sarah, Jane, Eliza. William J. married Monique Navarre, grand-daughter of Robert Navarre.

It is interesting to note that Mr. W. D. Balfour, M.P.P., for South Essex, 1882-96, married Josephine Broadhead, a great grand-daughter of William Macomb, the member for Kent in 1792-96, and that Mr. W. J. McKee, M.P.P., for South Essex, 1896-1902, married Mary Baby, daughter of Charles Baby and grand-daughter of Hon. Jacques Baby, the representative of the western district in the Legislative Council.

Though most of the descendants of William Macomb are residents of the United States, he was loyal to the British cause. As his name does not appear in the Quebec Almanac for 1796, the presumption is that, through illness or some other cause he may have dropped out of the Legislature. The name of Alexander Campbell is also left out of that list—the suggestion in his case is that he had removed from Upper Canada.

As showing the manner of man William Macomb was, the following extract from Governor's Hamilton's Report on the Detroit Post may be reproduced:—

"Mr. Macomb deserves that I should add thus much on this subject. When I had occasion to make purchases of provisions and goods on account of the Crown, the traders in general refused or scrupled to accept my orders or drafts, this person made no hesitation and from the beginning of the year 1773, to the present time, has furnished goods at a more reasonable rate than any other merchant. If his prices are compared with goods taken up for the Crown at other posts, I am well assured that they will be found more moderate. The distance and risk from Niagara to this place might make a considerable difference in Mr. Macomb's charges. I am told he has sold cheaper here than they have at Niagara. He has never charged commission or expenses, though he has given himself a vast deal of trouble in the purchase of Indian corn, flour, cattle, etc. He has advanced on the credit of the Crown to the amount of $12,000 New York currency at one time, though his place at that period was threatened with an attack by the rebels. While I enlarge on this subject, I but do justice to a perfectly honest man, who I believe has so far defied envy as to have the suffrages of his rivals in trade."

This extract was furnished by Mr. C. M. Burton of Detroit.

David William Smith was the son of John Smith, major of the 5th Regiment, stationed at Detroit from 1790 to 1792. As commanding officer the father was chairman of the Land Board of Hesse. D. W. Smith was at this time an ensign in his father's regiment. At the meeting of the Board, held 30th July, 1790, Major John Smith appears for the first time as chairman, and D. W. Smith as secretary. Two years after this the Major was transferred to Fort Niagara, and there he remained till his death, in 1795. The son, D. W. Smith, was transferred at the same time. Lt.-Governor Simcoe thus refers to the young member, for he was, at the time of his election, only 28 years of age: —

> "His Majesty's service has been essentially promoted by Lieutenant Smith, the son of Major Smith, who commanded for the last two years at Detroit, being elected by the inhabitants of that district into the Assembly. This gentleman owes this distinguished mark of favour to the singular gratitude of the people for the attention which he showed and the liberality and disinterestedness of his proceedings as Clerk, and indeed as the official person of the Land Board in that district." (Archives of Canada, 1891, page xxii.)

D. W. Smith studied law and was called to the Bar. He held many important and responsible positions under the Lt.-Governor, deputy judge, surveyor-general of lands, trustee of the six nations, etc. He moved to Newark and spent most of his time in connection with the land surveys and grants of land. He was made an Executive Councillor on the 2nd of March, 1796. At the elections for the second legislature he was returned, not for Kent, but for one of the Lincolns. I am inclined to the opinion that it was for 4th Lincoln and Norfolk, as in the third parliament he was elected member for the new riding of Norfolk, Oxford and Middlesex. He had, I am told, a residence on the lake shore in Norfolk in addition to his residence at Newark. He was the Speaker of the second and third legislatures, and when he retired, in 1804, he was succeeded by Benajah Mallory. He returned to England and for some years managed the estate of the Duke of Northumberland. He was knighted in 1821, and died in 1837.

When D. W. Smith left Canada in 1804, he took with him a large quantity of papers, letters and maps that had an important bearing on the early settlement of this province. A few years ago they were placed on sale and were secured by Dr. James Bain, Librarian of the Toronto Public Library. These papers are now in that library. Among them is a copy of "A Memorandum of the dates of the Hon. D. W. Smith's Appointment," prepared by himself. It will be found in print in the report of the Association of Ontario Land Surveyors for 1894, pages 146 and 147. The following statement of his Canadian appointments is reproduced:—

Ensign in the 5th Regiment of Foot	8th September,	1779
Acting Paymaster to the same	8th September,	1780
Secretary of the Land Board, Detroit	4th June,	1790
Secretary to the Commandant, Detroit	4th June,	1790
Fort Adjutant	4th June,	1790
Assistant Engineer		1791
Deputy Quarter Master, Niagara	12th April,	1792
Secretary to the Commandant, Niagara	12th June,	1792
Member of First Canadian Parliament	27th August,	1792
Justice of Peace	27th August,	1792
Surveyor General of Lands	28th September,	1792
Deputy Judge Advocate	8th October,	1792
Member of all the Land Boards	27th October,	1792
Vice-President of Agricultural Society	27th October,	1792
Articled to the Attorney-General	2nd June,	1793
Called to the Bar	7th July,	1794
Major to Provincial Horse Artillery	18th August,	1794
Captain in 5th Regiment of Foot	2nd September,	1795
Privy Councillor	2nd March,	1796
Deputy Lieutenant for County of Lincoln	1st August,	1796
Member of 2nd Parliament	18th August,	1796
Colonel of Lincoln Militia	7th January,	1797
Judge of Court of Requests	7th January,	1797
Speaker of House of Commons	7th June,	1797
Commissioner for Examining Public Offices	12th August,	1797
Trustee for the Six Nations	10th October,	1797
Colonel of York Militia, 2nd Battalion	1st June,	1798
Lieutenant of the County of York	3rd December,	1798
Master in Chancery	17th July,	1799
Member of 3rd Parliament	18th August,	1799
Re-chosen Speaker	June	1801
Commissioner of Growth of Hemp	28th July,	1801
Commissioner for Administering the Government	1st September,	1801
Resigned my appointments and a pension for my services	10th May,	1804

He was fairly entitled to his knighthood on his Canadian record alone.

The list gives us the date of the general elections for the 1st, 2nd and 3rd parliaments, and also the date of organization of the first Agricultural Society of Upper Canada.

Among the valuable contributions to Upper Canadian history by D. W. Smith, is the Gazetteer of 1799 with the accompanying map. The reprint in the Canadian Journal of 1876, with annotations by Rev. Dr. Scadding is, however, of more value than the original scarce volume. In the Toronto Public Library collection of Smith papers is a manuscript map of the province of 1792 based on Simcoe's Proclamation.

Thomas McKee and Thomas Smith were chosen to represent Kent in the second House. Thomas McKee was the son of Colonel Alexander McKee, who had been the Indian Agent at Pittsburg before the War. He was the great grandfather of W. J. McKee, M.P.P., who, from 1896 to 1902 represented practically the same riding. Thomas Smith was the secretary of the Land Board of Hesse before D. W. Smith was appointed. I find this note about him: "Loyalist, came into Niagara in '76 with a plan of Fort Stanwix and Intelligence."

These are the men who formed the first Legislative Assembly of Upper Canada. We have located them all, with the exception of one doubtful case. The legislature was not the all-powerful body a century ago that it is to-day, but it was the beginning of responsible government, and it should add interest to our study of provincial development to know something of the men who initiated that movement. The study of men adds interest to the study of measures.

I give herewith a list of the members of the first Legislative Assembly, 1792-1796, and of the second Legislative Assembly, 1796-1800. It will be seen that only two members sat in both assemblies, namely, John Macdonell, the Speaker of the first, and David William Smith, the Speaker of the second. In 1800 the province was rearranged to provide for 19 members.

Glengarry, 1st Riding	1792 to 1796	Hugh Macdonnell
	1796 to 1800	Richard Wilkinson
Glengarry, 2nd Riding	1792 to 1796	John Macdonell (Speaker)
	1796 to 1800	John Macdonell
Stormont	1792 to 1796	Jeremiah French
	1796 to 1800	Robert I. D. Gray
Dundas	1792 to	Alexander Campbell
	1796 to 1800	Thomas Fraser
Grenville	1792 to 1796	Ephraim Jones
	1796 to 1800	Dr. Solomon Jones
Leeds and Frontenac	1792 to 1796	John White
	1796 to 1800	Edward Jessup
Addington and Ontario	1792 to 1796	Joshua Booth
	1796 to 1798	Christopher Robinson
	1800	William Fairfield

Lenox, Hastings and Northumberland	1792 to 1796	Hazelton Spencer
	1796 to 1800	Timothy Thompson
Prince Edward and Adolphustown	1792	(Philip Dorland)
	1792 to 1796	Peter Vanalstine
	1796 to 1800	David McGregor Rogers
Durham, York, and 1st Lincoln	1792 to 1796	Nathaniel Pettit
	1796 to 1800	Richard Beasley
2nd Lincoln	1792 to 1796	Benjamin Pawling
	1796 to 1800	Samuel Street
3rd Lincoln	1792 to 1796	Isaac Swayzie
	1796 to 1800	— Hardison
4th Lincoln and Norfolk	1792 to 1796	Parshall Terry
	1796 to 1800	David William Smith
Suffolk and Essex	1792 to 1796	Francis Baby
	1796 to 1800	John Cornwall
Kent (two members)	1792 to 1796	David Wm. Smith and William Macomb
	1796 to 1800	Thomas Smith and Thomas McKee

ADDENDUM

Since the preceding paper was set up and proof-read, and just as it is going to press, I have received from Mr. P. Gagnon, of Quebec, the following list taken from *The Quebec Magazine* for December, 1792. The late find is interesting as having been printed so soon after the first session. It is followed in the magazine by a *resumé* of the bills passed, and a copy of the speech of Lieut.-Governor Simcoe on proroguing the House. Having definitely settled most of the members and the constituencies, we refer to it for help in regard to the doubtful cases. It contains several mistakes, that may be set down as typographical, for instance, " Prince Edward " and " Northumberland " should each be dropped down one line, and " 1st Riding York, Lincoln " should be " 1st Riding Lincoln and York." According to our investigations, the names of "David Wm. Smith" and "Francis Baby" should be interchanged. What does it settle? First, that "— Young" as a member is a mistake, and that *Parshall Terry* was the member elected for 4th Lincoln and Norfolk. Secondly, the list of members for the Lincolns is the same as I had already worked out. The spelling of the names on this list is incorrect in many cases. Petit should be Pettit; McDonell should be Macdonell; McComb, Macomb; Swazye, Swayze, etc., but the most interesting is the changing of the name of the long lost member for 4th Lincoln from Parshall Terry to Partial Jerry.

Upper Canada: List of Members of the House of Assembly of Upper Canada.

Hugh McDonell	First Riding	Glengarry
John McDonell	Second Riding	Glengarry
Jeremiah French		Stormont
Alex. Campbell		Dundas
Ephraim Jones		Grenville
John White		Leeds and Frontenac
Joshua Booth		Ontario and Addington, Prince Edward
Philip Dorland		Northumberland
Hazelton Spencer		Lennox, Hastings
Nathaniel Petit	First Riding	York, Lincoln
Benj. Pauling	Second Riding	Lincoln
Isaac Swazye	Third Riding	Lincoln
Partial Jerry	Fourth Riding	Lincoln, Norfolk
David W. Smith		Suffolk and Essex
William McComb Francis Baby		Kent

N.B.—Philip Dorland, Esq., vacated his seat by refusing to take the oath prescribed by the Act of Parliament, and a new writ was issued for the county to return another member. (Mr. Dorland is a Quaker.)

(*The Quebec Magazine*, December, 1792)

V.—*Family Memoirs of the McCollom Family, U. E. Loyalists.*

By W. A. McCOLLOM, Tilsonburg.

(Communicated by Sir John Bourinot, and read May 27, 1902.)

Incidents and record of family of James McCollom, who came from Argyleshire, Scotland, about the year 1765, and first located in New Jersey where he obtained lands, and was married to Miss Sarah Campbell, who had two children, and died soon after the birth of the second child.

Several years afterward he was again married to Miss Eunice French, and as travelling westward appears to have been popular even at that early date, he disposed of his property in New Jersey and, with other pioneers, followed up the beautiful Hudson River to a place called Cherry Valley in New York State, and again obtained land, upon which he resided with his family during the period of the Revolutionary War. Other property in vicinity of Albany was many years ago reported to be of fabulous value, as a portion of the city is located upon it.

Mrs. Folwell, an aged lady of Toronto, whose mother was formerly Mary McCollom, a daughter of James and Eunice McCollom, states that her grandfather was well brought up and educated, and a man of rank in Scotland. He had not been brought up to work and was not inclined to undertake it, but was a great Mason and Presbyterian, and was disposed to share occasionally in convivial habits that were popular in those days. He was also a staunch adherent to the cause of Royalty and to the British Empire, with her substantial forms of Government and her established laws and progress in arts, science, literature and religion, and with a firm belief in ability of her noble statesmen to rectify by constitutional methods the oppressive legislation enacted by British parliament, and assented to by King George III., to compel Colonists to pay a portion of the enormous war debt incurred very largely in their behalf during the Seven Years' War. Also to amend the laws limiting exports to British channels only, limiting amount of colonial manufactures, and of shipping, shipments, etc. He firmly declined to give up adherence to a substantial Imperial form of government for what he deemed a shadowy republican system which he, with many thousands of the most eminent and cultured men in the country, considered a very hazardous chaotic experiment liable to result in disaster, internicine strife and disintegration of the territory, or that it might become absorbed by one of the great European powers, whose unwilling vassals they might have remained. There is ample evidence that this conspiracy among crowned heads of Europe to crush out republicanism might have become effective a few years later had not the plan been thwarted through disapproval of the scheme by Great Britain whose influence and valour then intervened to prevent the contemplated invasion.

James McCollom also refused to be coerced into taking up arms against the Mother Country during the continuance of the war, or to countenance the many extremely harsh methods of persecution adopted against the loyalists by the relentless and lawless revolutionists who, after the capitulation, found that with the change of system of government, old statutes were considered suspended or abolished and new laws not yet enacted, or new methods of legal procedure established or enforced, so that they were therefore enabled in numerous instances to carry out without restraint the most atrocious designs of mob violence against quiet and orderly people, whose homes, estates and other property they coveted and were eager to possess. This persecution was also carried on to so great an extreme by constituted authorities under the new republican regime that the property of loyalist families was confiscated, and being thus debarred from residence and quiet enjoyment of homes established by years of economy and industry, the only resource left them was to desert their homes and associations that were dear to them, and, with what they could carry or pack on animals, to follow the lonely trails through a long wilderness, where Indians roamed and wild beasts were plentiful, toward Canada to hew new homes out of the dense forests and to dwell once more beneath the British flag, which was to them and has been to many thousands since, the most inspiring emblem of freedom and justice to be found in the world. The heavy infliction imposed on these people we can only conjecture, as heads of families with delicate women and children, and in some instances with aged people, all took a last sad survey of their home and familiar surroundings and then started on their long, weary and eventful journey northward.

James McCollom and family undertook the journey in 1788 with what they could conveniently move. Goods were packed on horseback and two small children balanced in panniers with other goods on one horse. The eldest son, John, and a smaller brother, Joseph, drove a few cattle through the perils and lonely wilderness. At night to insure safety from wild beasts, they would build a camp fire, close to which they would remain, and which they dared not leave till day dawned. One night their cattle were frightened by some large wild animal and ran until sound of the bell was lost in the distance. The next morning, by following in the direction the cattle had gone, they were recovered again. On another occasion John, then in his sixteenth year, nearly lost his valued rifle, on which he depended for safety, through cupidity of an Indian who came up to their camp and picked up the rifle with the words, "me swap," replacing it with his dilapidated musket. John sprang quickly and struck the Indian a heavy blow on the neck that laid him out for a while, John then recovered his gun, and the Indian was contented to depart with his musket.

After a variety of thrilling adventures the family were re-united again at Genesee, N.Y., where they remained for a time and then continued their journey into Canada, settling finally near where the village of Smithville now stands. James McCollom obtained a good tract of land and resided upon it with his family until his death.

The entry of crown lands was gazetted at Niagara, on page (111) of a list dated on the margin 1797, and copy published at Ottawa, on page (148) of the Canadian archives of early State Papers of Upper Canada." The crown deed conveying 200 acres to James McCollom is dated 1803, and is now, in 1898, in possession of Miss Catharine McCollom, of Smithville, Ontario, who is of the fourth generation. A crown deed for the adjoining 200 acres was conveyed to John McCollom, eldest son of James McCollom, and the property is now in the possession of Mr. Melvin McCollom, of Smithville, who is also of the fourth generation.

John McCollom, the eldest son of James McCollom, was born in the State of New Jersey, January 30th, 1773, and he and his sister Sarah, had the great misfortune to lose their mother when both were quite young. They were removed with their father's family to Cherry Valley, N.Y., and thence ultimately to Canada, as already mentioned. He grew up healthy and vigorous and with a kind disposition, but circumstances were not favourable for enjoyment on account of prevalent alarms and excitement during the period of the Revolutionary War, and were also very trying subsequently when he was compelled to leave home, early associates and familiar scenes for others untried and new, with relatives to undertake, what was at that time a long, perilous journey, to reach British territory again. He assisted in opening the Ridge Road, a leading thoroughfare running westward to Buffalo. Having attained his majority about the time of coming to Canada, he worked industriously to assist in establishing the new home and for the improvement of the new country. He obtained a crown deed in 1802 for 200 acres of land adjoining his father's homestead near Smithville, and, having married Miss Sarah Sternberg, they resided upon this farm until 1808, when he disposed of it and obtained another on the north side of Lake Ontario, which lies on Dundas Street, four miles back from Burlington and ten miles northeast from Hamilton. But this new and pleasantly situated home was not to be peacefully enjoyed very long with his wife and small children, as alarming rumours of war were again circulating and causing very intense excitement and anxiety throughout the sparsely settled districts of Upper and Lower Canada.

Many Americans, filled with military ambition and elated over successful establishment of the republic, were very desirous of extending its borders over the Continent, beginning with annexation of Canada, which they deemed easy to obtain, and while the British army were again engaged in a great Continental conflict (ending in the Battle of Waterloo, and defeat of Napoleon in 1815) was considered the opportune time to accomplish their design. Emissaries had been for some time in Canada striving to stir up discontent and obtain recruits without success. A variety of pretexts were assigned as cause for war, but it was generally understood then in the United States, and is since conceded by historians, that the capture of Canada was the real object Americans wished to attain. While the sentiment was not by any means unanimous among them, the war party was sufficiently strong to induce Congress to declare war on June 18th, 1812. When the exciting news was received in Canada that war was proclaimed, towns and villages were soon resounding with bugle calls and clash of arms, and militia men were busy with their drill in every settled district. Upon them the defence of the country largely depended as there was only a few British troops in Canada at that time.

As an officer in the militia, John McCollom took an active part in helping to repel the American invading forces from the Niagara district in the war of 1812 to 1814, and was finally in the battle at Lundy's Lane, where many valiant men who had once been driven from their possessions fought as heroes to defend their loved ones and the new homes they had obtained and by hardest labour made. When marching into battle, a feeling of nervous timidity or anxiety pervaded the troops, but this was soon forgotten when first volleys were fired and comrades were falling. Only a bullet grazed his cheek, while hundreds around him fell in this the most fiercely contested engagement during the war. The British troops and Canadian militia under General Drummond only numbered 2,800 and were opposed by an American army of 5,000 men under General Brown.

The battle began at 5 p.m. July 26th, 1814, and continued without cessation and with telling effect on both sides till 9 p.m., when there was a brief respite and firing entirely ceased, and the unceasing roar of Niagara was again heard as a dirge of the ages. Huge masses of clouds covered the sky, and through rifts of these the moon occasionally shone upon the field of carnage and suffering. Rapid firing on both sides was soon resumed again with rushing onslaughts. Charges and counter-charges with hand-to-hand encounters were frequent, and the cannon at times almost muzzle to muzzle. The defence was heroically maintained by the small defending army until near midnight when firing again ceased; they lay upon their arms during the night, and when morning dawned they found that the United States troops had retreated from the field, had thrown their heavy baggage into the river, and, destroying the bridge at Chippewa after passing over it, retired to Fort Erie where they remained entrenched for a time too strongly for General Drummond to dislodge them after two attempts with his limited force, but they soon returned to United States territory again, with desires for conquest of Canada fully dispelled and content thereafter to remain within their own domain.

After this thrilling experience, John McCollom and wife and family of four daughters and one son, John S. McCollom, who was the youngest, resided peacefully upon the farm which he had obtained, and soon developed it into an attractive and comfortable home, at which the early Methodist ministers and other pioneers were always assured of kind hospitality. A few years subsequently the daughters were married and in homes of their own, and Mr. McCollom, assisted by his son, had good success in clearing the farm, in planting fruit and ornamental trees and in obtaining good returns as fruits of industry from crops, from the raising of stock, etc. With keen solicitude for the progress of religious and political affairs, the two very important factors in establishing growth of the new country on a substantial basis. They regarded with deep interest the beneficial spread of religion by ministers, who endured hardships in travelling over very extensive districts, among those in new settlements who had been for years almost entirely deprived of its ministrations. They watched closely with much concern the trend of political measures and issues, also the favouritism and many reprehensible methods of procedure adopted by those placed in authority by the Crown, as well as by those elected to the legislature through connivance of the former, whose dutiful servants or accomplices they thus became. Many prominent government positions with large salaries attached were for years given to relatives and scions of the British nobility, who presumed to look upon colonists as unworthy of consideration. Requisite legislation could not be obtained, as affairs of government were so largely conducted and manipulated by this irresponsible clique, designated The Family Compact, who had control of the revenues of the country to aid in maintaining their positions.

When general elections were held, a poll for voting was kept open a week at only one central place in a large riding or district, comprising several of the present counties. Elections were not held simultaneously in all constituencies over the province as at present, but proclamations were issued for different dates in each, so that it was more convenient for government officials, their assistants and sympathizers to throng each polling division, to resort to covert and disreputable methods with free liquor and bribery and often force, to get their favourite or faithful followers elected. In many instances this was accomplished by having a rowdy element in control of the polls for days at a time, to prevent all opposed to those Tory politicians from voting. The struggle for this privilege was often so great that lives were occasionally lost, or permanent injuries sustained. This continuous contest for justice was maintained until within very few years of the close of Mr. McCollom's life, at the age of seventy-four years. He was ruddy and vigorous to the last day of his life, with hair remarkably white and teeth as white and even as those of a child (having never lost but one), his appearance was venerable, and noted at church and other assemblages. He had seen and felt the disastrous consequences which resulted from Great Britain's loss of domain and prestige through errors of her King and Legislative and Privy Councillors, who allowed the most beautiful and fertile country in the world to slip from their control and to be lost to the Crown forever. For these reasons Mr. McCollom was the more urgent for the establishment of a responsible form of government, favourable to necessary reform measures, in sympathy with the people, and who could be depended upon to compile statutes necessary for their amelioration, thereby contributing to their happiness and prosperity. And to him and his son and the many pioneers contemporary with them who, contended honourably, manfully and constitutionally for the right, Canadians to-day owe a deep debt of gratitude for the reason that in this department of the British Empire the great principles of justice, morality and religious toleration were so thoroughly inculcated and established that a greater amount of freedom is enjoyed than in any other country in the world.

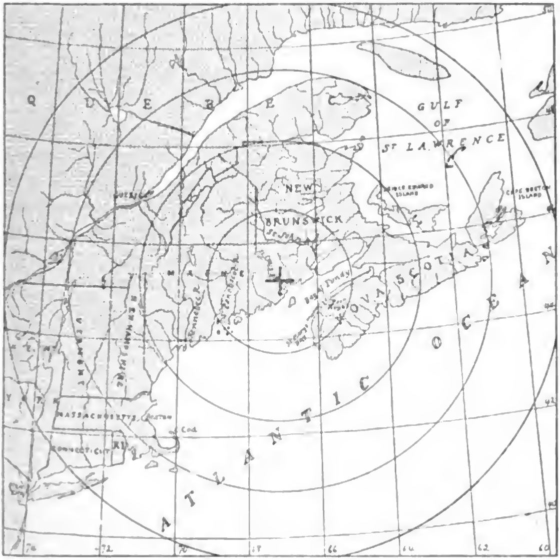


FIG. 1.—Map to show the geographical position of Dochet Island. It lies in the centre of the cross and of the circles. The circles are of one, two, three and four hundred miles radius.

VI.—*Dochet (St. Croix) Island,—A Monograph.*

By W. F. GANONG, M.A., PH.D.

(Read May 27, 1902.)

INTRODUCTION.
GEOGRAPHY.
GEOLOGY AND NATURAL HISTORY.
NAMES.
MAPS.
LITERATURE.
HISTORY.
  1. The Acadian Period, 1604-1632.
  2. The Boundary Discussions, 1796-1799.
  3. The Modern Period, 1799-1902.
  4. The Future.

In the beautiful River St. Croix, near to where it empties into the Bay of Passamaquoddy, lies a little island, justly celebrated as one of the most interesting historical localities in this part of America. It is the site of de Monts' ill-fated colony of 1604, and hence witnessed the real beginning of the permanent settlement of Canada; later it became again prominent in the discussions between the United States and Great Britain over their boundaries, and was the chief determinant in fixing the St. Croix as the international boundary; while other events in its annals are not without at least local importance. Though thus of interest to many people, its full history has not yet been written, and the materials for it are scattered and inaccessible, or even, in no small part, existent only in manuscript or tradition. It is the object of this paper to set forth, as accurately, fully and clearly as the writer may be able, all that is known of the history of this island.[1]

---

[1] At this point I desire to acknowledge, with my best thanks, the very kind assistance I have received from several gentlemen in the preparation of this paper. Especially do I wish to mention the indispensable and skilled bibliographical aid I have received in generous abundance from my friend Mr. Victor H. Paltsits, of the Lenox Library, and the cordial co-operation of Rev. Dr. Raymond, of St. John, who allowed me the free use of the valuable records of the Boundary Commission in his possession, with permission to publish such of them as I chose. I have had valued information, too, from Captain Joseph Huckins, the present keeper of the lighthouse on the island, from Mr. James Vroom, of St. Stephen, and from Rev. Joseph Lee, of Red Beach. It may not be inappropriate to add that I have myself been familiar with the island and its surroundings from early boyhood, and it is therefore with particular satisfaction that I have found myself privileged to write its history.

GEOGRAPHY.

The St. Croix River, once nearly the centre of ancient Acadia, is now from source to mouth a part of the international boundary between the United States and Canada, between the State of Maine and the Province of New Brunswick (Fig. 1). Its mouth, as legally established and accepted by custom, is at Joes Point near St. Andrews on Passamaquoddy Bay (Fig. 2), but as a matter of geographical fact, it is farther north at the Devils Head, the part between these two points, some seven miles in length, and one and a half to two miles

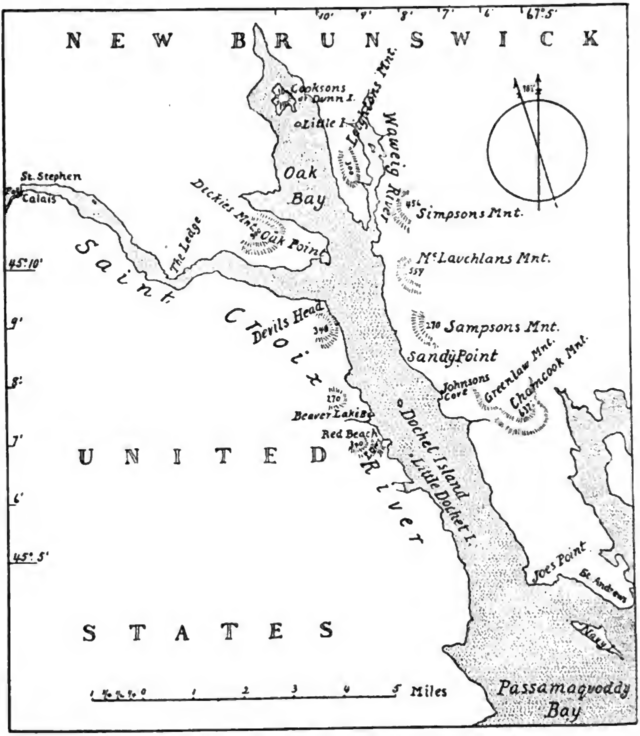


FIG. 2.—Map to show the surroundings of Dochet Island.

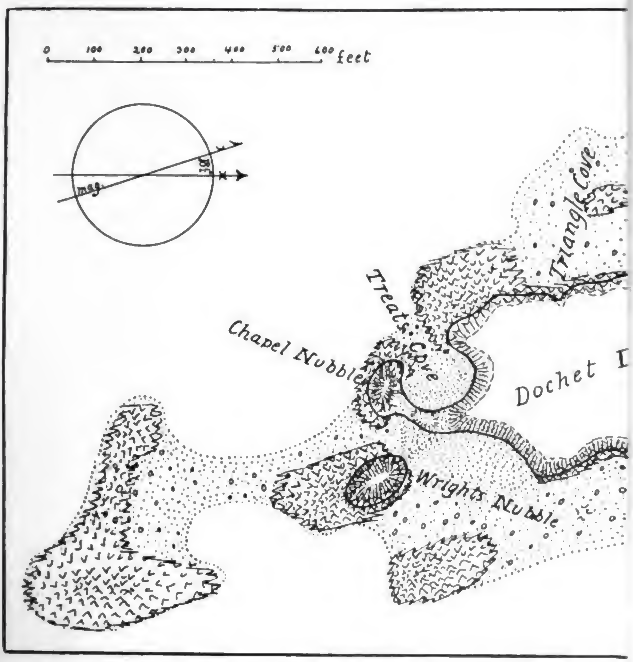


FIG. 3.—Map of Dochet Island with its surrounding ledges. From

in breadth, is really but an arm of the sea, salt and tidal. Nearly midway of this estuary, and midway, too, between its banks, lies Dochet Island, in latitude 45° 07′ 44″, and longitude 67° 08′ 03″. The deepest channel is on the eastward, thus making the island a part of the United States.

The situation of the island is extremely beautiful. Both banks of the river, clothed with well-cultivated farms interspersed with lines and groups of trees and large areas of forest, slope upward into ridges and hills, culminating in Greenlaw and Chamcook, whose abrupt sides and rocky summits rise above six hundred feet from the tide. To the northward one looks into Oak Bay with its prominent island and distant shores framed by the nearer Devil's Head, wooded and abrupt, and the lofty hills of the Canadian shore. To the southward beyond the widening banks, lies Passamaquoddy, and over it, faint and far, the low hills of Deer Island. Seen at its best, on soft summer days, there is much colour in the landscape, a bright blue sky and a deep blue sea, a dark green of the forest and a bright green of the fields, and here and there a red and a brown of the rocks. It is a goodly country, fair to see, the very perfection of quiet new world scenery, never losing its charm for those who have known it.

The island is a very small one (Fig. 3), less than 300 yards (about one-sixth of a mile) in length in its main part, or less than 400 yards including the partially detached "Nubbles,"[1] and not over 125 yards in extreme breadth. It encloses in the main part about 5 acres. The highest point, on a rocky ledge a little to the east of its centre (Fig. 14), is about 52 feet above extreme high tide mark,[2] or about 62 feet above mean tide level. From this point there is a slope in all directions, at first (on the rocky part) abrupt, but soon, (on the soil parts) more level. The entire island is, however, markedly tilted towards the westward, so that while the eastern shore is a continuous bluff rising nearly 40 feet above high tide, on the west it slopes in places almost down to high tide level. These features of slope are well illustrated in the accompanying photographs (Figs. 17, 18). The eastern bluffs of the island are of clay and sand, bearing a dense growth of small trees and resting upon granite rock except at the southern end, where an abrupt treeless bluff of sand without vegetation has no visible rock, but only sand, beneath it. The low shore of the western side shows a thin soil resting upon rock. and bearing but a few scanty bushes and very small trees, while the remainder of the island, all fair soil excepting the rocky band of ledges across it, is cleared and cultivated as garden, or utilized as pasture (Fig. 14). At the southern end of the main island stand two partially isolated "Nubbles," obviously once a part of the main island, consisting of masses of sand and clay, heavily wooded with small trees, resting upon granitic rocks. The larger is now cut off from the main island at every high tide, but the smaller is still attached to it by a low ridge of sand, never, or extremely rarely, crossed by the tide. Around the islands are many ledges, shown on the maps (Figs. 3, 4), connected with one another by sand, gravel and boulders, extending on the eastward into a remarkable, long, sandy point. Beyond the low-tide limits of these ledges, as a rule, the shores slope down rather abruptly to the greater depths of the river; so that the ledges as a whole represent a rather distinct and marked elevation above the general bed of the river.

---

[1] Nubble is a word used frequently in this region for small semi-detached islets.

[2] According to levels taken by myself.

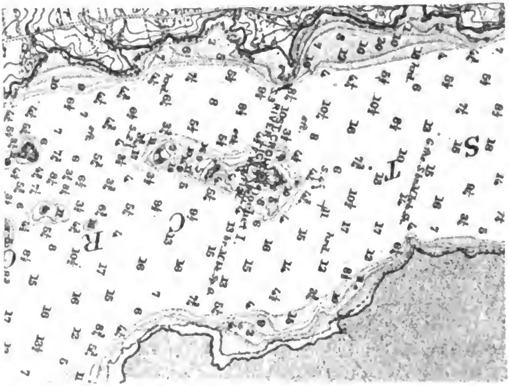


FIG. 4.—Dochet Island and its immediate surroundings. From the United States Coast and Geodetic Survey Chart No. 300, the largest and best published map of the Island. Original size. It is set in this position in order to allow of better comparison with the maps of figures 3, 8, 12, 14, and hence, like them, is adjusted to the magnetic meridian, with north at the right and west at the top.

The only buildings upon the island are those of the United States Light Station, comprising a house with the lantern, carrying a revolving flash light, upon its roof, and various lesser buildings connected with the station, together with a small shed used by the weir fishermen (Fig. 14). The only residents are the keeper of the light and his family.

GEOLOGY AND NATURAL HISTORY.

The history of any place is deeply influenced by the physical environment, and some knowledge of this is essential to a full understanding of the course of historic events. We must note, therefore, the natural circumstances and productions of Dochet Island.

Geology. Geologically, Dochet Island consists of a base and core of solid rock rising to over fifty feet above high tide level, resting upon which is a mass of clay sand and gravel (Fig. 5). The basal rock, which may be seen nearly everywhere about the island, is a red granite, like that forming the western bank of the river, and believed by geologists to be of Devonian age and intrusive origin.[1]

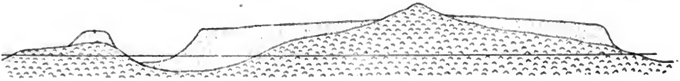


FIG. 5.—Ideal median section through Dochet Island, as seen from the east. The horizontal line is that of high tide; the soil is dotted and the rock shown by angles. At the left may be seen Wright's Nubble, and next it the sand bluff.

A question of very great interest now arises, as to the origin, or mode of formation, of the isolated rocky mass which forms the basis of the island. Why does it exist here, rising abruptly from the bed of a great river with deep water all about it? At present, owing to insufficient geological study of the region, this question cannot be answered with any certainty, but clues exist which will enable us to form at least a theory of some probability. The rock of which the island is composed seems plainly to be intrusive Devonian granite, that is, granite which forced its way upwards in a molten state from deep in the earth, filling gaps and areas of weakness caused by movements of the earth's crust in the older Silurian rocks. Now, at this time, it is fairly certain, the St. Croix river did not exist, and the present river bed was filled with Silurian rocks; or, more correctly, the river bed had not yet been cut out of the rocks. On the present site of the island there was probably some gap, or fault-line, in the Silurian rocks, and into this tho molten granite was forced from below, just as it was in many other isolated masses now forming hills in this region. Later, in the course of the ages, the St. Croix river began to flow over this place, and gradually, by the slow but resistless process of erosion, aided by the presence of contact and fault-lines, cut down the rocks until the river bed reached the granitic mass now forming the island. After that it cut out the softer Silurian rocks around it much faster than it could cut the hard granite itself, so that finally the granitic mass was left as a hill rising from a plain of the softer rocks. Then the land sank, and the sea entered this valley to such a depth that the top of the hill only was left above the surface; and this is the probable origin of the rocky part of Dochet Island.

---

[1] The Geological Survey (of Canada) map of Charlotte County, the only one yet published which colours the island, makes it Silurian, which is an error. There appear to be two bands of granite on the island. one of lighter red colour and coarser texture forming the northern end and western side, and the other of darker red colour and much finer grain forming the eastern margin, together with the southern end and the ledges to the southward. An approximate contact line between them may be traced along the eastern shore. While the western coast of the river is composed of this same granite, the eastern shore is not, at least not opposite the island, suggesting that a fault line, or line of contact must run, doubtless following the deeper channel, along the river on the eastward of the island, a line which may be connected with the formation of this part of the river and its extension into Oak Bay. Little Dochet Island, on the other hand, is of very different formation, being a coarse conglomerate supposedly belonging to the Lower Carboniferous formation (newer than the Devonian), and it is probable that the line of contact between the two formations lies in the deep channel between the two islands.

The soil resting upon these rocks is of glacial origin. It is known to geologists that in the glacial period, some thirty or more thousands of years since, a sheet of ice several thousands of feet in thickness moved southeastward over this region. This ice smoothed these granite rocks, as may be seen beautifully at the north end of the island, and would have left them but naked rounded ledges had not the same ice sheet carried an abundance of soil ground from the rocks in its passage, which soil was deposited, especially as it melted, around and in the lee of the core of the island. The glacial movement on the island was almost exactly true southeast (a trifle east), as is clearly shown by the course of the glacial grooves on the north end of the island; this is why the great mass of the soil of the island lies on the southeast side of the rocky axis in the form of a long point ending in an abrupt bluff (Fig. 5), precisely such a point as is found in similar situations near by at Sand Point, Oak Point, Navy Island and elsewhere. The fact that this soil is mostly fine, thus forming good agricultural land, indicates that its deposition took place in quiet water. Had the conditions been different, and a coarse boulder soil replaced it, Dochet Island might have had no history. Only a few boulders exist on and around the island. Those above the tide, notably the huge one to the northward of the lighthouse, were, of course, brought here by the glacial ice from far to the northward at the time the soil was laid down, which explains their composition out of rock different from that of the island. Those below high tide were, no doubt, brought for the most part at the same time, though some of them may have been drifted by floating ice in recent times from the mainland up the river. Following the glacial period this region was submerged beneath the sea, during which time this glacial soil was, no doubt, more or less worked over and given the final details of its levels and character.

The soil of the island consists of sand and clay much intermingled, and forming a fine agricultural soil of fair quality on which garden crops thrive well, a fact of some importance in its history. The intermingling of the clay and sand, instead of its separation into beds, makes the soil very pervious to water; and this, together with its shallowness, does not allow the presence of springs, nor the possibility of good wells, a fact which had, as we shall see, a great influence upon the early history of the island.[1]

The surface of the island, as already mentioned, slopes to near the water's edge on the western side of the island, but elsewhere ends in bluffs of soil descending steeply to the rocks beneath, or to the sandy beach. The bluffs on the north and east sides are covered with small trees, but on the south the vegetation is wanting, and the bluff of sand and clay is so abrupt (Fig. 20, 24) that the least disturbance is enough to bring it down in an avalanche. Now, the foot of this bluff which rests on the sand beach, and the feet of others on the rocks as well, are washed by the waves at the highest tides, and they are obviously being eaten away by the waves and tide. That a washing away of the island is steadily going on is attested not only by the universal testimony of residents in the vicinity, but also by a comparison of the several existent maps of the island, which also afford a fair measure of its amount. If we compare the ancient map of 1604 made by Champlain (Fig. 8), with the much later map by Wright (Fig. 12), and with the two modern maps of 1885 and 1902 (Figs. 13, 3), a subject made the plainer if they are reduced to the same scale and superposed as in the accompanying figures (Figs. 6 and 14[2]), it will be seen that in three hundred years the island has lost little on its northern and western sides, but has lost greatly at its southern end and on the southwest, where large sections of the island, including the site of the cemetery of 1604 and the knoll on which de Monts mounted his cannon, together with much of the island north of

---

[1] The light-keeper has to rely for his water supply upon reservoirs filled by the rain collected from the roof of his house.

[2] Champlain's map, being sketchy and in some ways inaccurate, must be altered somewhat to fit the actual form of the island. It is, however, given exactly in Fig. 6, but in Fig. 14 it is altered to accord as nearly as possible with what must have been the real form of the island.

Wright's Nubble, have been totally removed[1] (Fig. 14). That this process is still going on is shown by the fact that every year the light-keeper notes some backward movement of the southern bluff, and also by the fact that the site of a well, within twenty years surrounded by the upland and of some use in wet times, is now marked by a ring of stones on the rocky beach several feet from the nearest upland (Fig. 14). Since the soil of the island extended so far beyond its present limits within historic times, it is a natural inference that in yet earlier periods it extended still farther, and covered the neighbouring ledges, not only those on the south, but those on the north and west as well; but it is unlikely that it ever extended, as locally often stated, to include Little Dochet Island, for there is a deep-water channel between. Now, a continuous washing away of an island after this manner is known by geologists to be possible only where the coast is sinking beneath the sea, and of such a sinking in this region there is much other evidence.[2] The rate of the subsidence is not known, but it is probably between one and two feet a century. The rocky base of the island, doubtless, stood five or six feet higher above the tide in Champlain's time than now; and in still earlier times it was yet higher, so that all of the

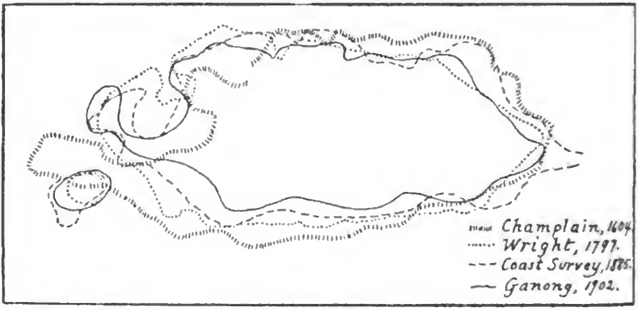


FIG. 6.—The four principal maps of Dochet Island reduced to the same scale and superposed.

---

[1] The removal is not wholly natural, for prior to 1865 much sand was removed to the mainland for building purposes, though in an amount inconsiderable in comparison with that which has been washed away.

[2] Summarized in a note by the present writer in the Bulletin of the Natural History Society of New Brunswick, No. XIX., 1901, 339. It is of interest to note that one of the pieces of evidences cited in that article is derived from this island, namely,—on Wright's map (Fig. 12) a certain ledge is described as "somewhat green at its top," implying that it then bore vegetation, whereas now it is bare of vegetation, and apparently overwashed by the highest tides.

ledges around the island were probably formerly covered with soil raised above the reach of the tide. Since the subsidence appears to be still going on, we can foresee the time when the soil of the island will, unless artificially prevented, be entirely washed away, leaving behind but a series of bare rocky ledges. This, however, is still far in the future, and engineering skill can, by the use of retaining walls and other appropriate devices, preserve the island practically unchanged for many a century to come.

Tides.— The tides at the island, as determined by the United States Coast Survey and recorded upon their charts (Chart No. 300), have an average vertical range of 19·9 feet. The range of the highest spring tides is between 22 and 23 feet. These tides cause currents in the river of some two miles an hour at the extreme, a rate sometimes troublesome but never dangerous to navigation, even by small boats. The appearance of the island changes much with the tides, for the reefs are so elevated and extensive that when the sea is out the size of the island is increased several fold (Fig. 3) by an irregular margin, in places of rock clad with brown seaweed, and elsewhere of boulders or sand, while at high tide but little is to be seen beyond the margin of the soil of the main island and the nubbles, which then seem to float lightly upon the waves.[1]

Climate.— The climate of the island may be described in general terms as that characteristic of a place half way between equator and pole, on the eastern margin of a continent; but it is modified in the present case by the very cold water which occupies the deep arm of the sea in which the island lies. Hence it presents a marked alternation between a cold winter and a warm summer, but without great extremes, and in summer it is considerably cooler than normal for its latitude. The keeper of the light-house on the island, who has noted the temperature daily for over twenty years past, informs me that the coldest days of winter are about —10° F., but an extreme of —28° F. has been noted, and the hottest days of summer average about 85°, with a recorded extreme of 92°. A very satisfactory idea of the climate of the island can be gathered from the records kept at St. Andrews, N.B., which, only six miles away and seated upon the end of a long peninsula projecting into Passamaquoddy Bay, must have a climate nearly identical with that of the island. The climate of St. Andrews, as shown by the averages for a large series of years, is, according to a table supplied to me by the Meteorological Office of Canada, as follows: —

---

[1] In the map, Fig. 3, the high tide mark is shown by the continuous line, and low tide by the marginal dotted lines. The angles indicate rocky ledges, the circles boulders, and the dots sand. The broken line shows the outline of the grassy or wooded upland.

ST. ANDREWS.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Av'age
Mean highest......	30·0	29·8	36·5	48·4	59·1	67·6	73·3	71·6	64·9	53·7	44·0	34·2	51·1
Mean lowest.......	10·0	10·4	20·0	29·6	38·9	47·2	52·0	52·8	47·2	37·5	27·9	14·4	32·3
Mean temperature.	20·0	20·1	28·3	39·0	49·0	57·4	62·7	62·2	56·0	45·6	36·0	24·3	41·7
Mean daily range..	20·0	19·4	16·5	18·8	20·2	20·4	21·3	18·8	17·7	16·2	16·1	19·8	18·8
Absolutely highest	53·3	48·3	49·8	67·7	86·6	87·6	92·7	89·6	81·1	73·6	61·7	54·9	92·7
Absolutely lowest.	−19·4	−18·1	− 2·4	9·6	29·3	37·6	45·2	44·2	33·0	20·3	3·1	−14·4	−19·4
Percent. of cloud..	46	47	51	45	46	42	44	42	40	47	51	50	46
Precipitation (inch)	4·25	3·86	3·98	2·34	3·15	3·00	3·20	3·22	2·56	3·52	3·32	3·76	40·16

From these figures it will be plain that the summer climate is always cool,[1] with much sunshine and a moderate amount of rain. The winter, likewise, is generally moderate, though it may at times become severe. Often the winters are so mild that little ice forms in the vicinity of the island; but at times they become so severe that much ice forms over the nearly pure salt water about the island, and it occasionally, though very rarely, happens that a complete ice bridge, across which one can walk, forms from the island to the shore at Red Beach, and there are all gradations between these extremes. It not infrequently happens that the floating ice makes it difficult or even unsafe to cross from the island in a small boat, especially when there is any wind.

As to other features of the climate, there is occasional fog in summer, though not in winter. The precipitation of over 40 inches is a fair amount for a temperate region.

The importance of these facts to our present subject lies in the effect of the climate upon the settlement of de Monts in 1604. The full account of that winter left us by Champlain and Lescarbot, and given later in this paper, shows that it must have been one of marked, if not of extreme, severity. This, without doubt, more than anything else, determined the abandonment of the St. Croix as the site of a settlement. Had the first, and the few later winters, been as mild as are often experienced in this vicinity, it is quite likely that this region, if not the island itself, would have remained the centre of French settlement and power in Acadia, in which case its later history, and perhaps its status to-day, would have been markedly different.

---

[1] The coolness of the summer above-mentioned is due in part at least to the coldness of the surrounding sea water throughout the summer. No figures are available, but it is a fact that the water is always much too cold for comfortable bathing, so I presume it does not rise above 50°F. The coldness is due primarily to the depth of the neighbouring waters in combination with the strength of the tidal currents, which continually stir up the colder bottom water, thus preventing the warming up of the surface. And this is perhaps aided through the bringing in by the tides of the cold currents descending from the north along the Nova Scotia coast.

Natural History.— The natural history of the island presents nothing peculiar, so far as I can find. No attempt has yet been made to list the plants or animals. The plants which naturally occur there are the common trees of the vicinity, pines, spruces, firs, maples, birches, mountain ash, cedar, and (formerly) oak, thus comprising the most useful trees native to the region. With these grow certain shrubs and many common herbs, including a fringe of the common salt plants around the margin of the salt water, together with many plants of cultivation in garden and field. On the rocks between tide marks grows a great profusion of the brown rock weed, and many other forms of the seaweeds, or Algæ, occur there.

Of animal life there is little on the island, but much in the waters around it. The larger land mammals are wanting, and probably, owing to the lack of fresh water, never regularly lived there. In the sea around the island, however, the porpoise is frequently, and the whale occasionally to be seen, as in Champlain's day,[1] and seals also occur, and breed on the ledges about the island. The common birds of the neighbourhood, the sea-gulls and the song birds, of course, are present, but no game birds of any importance now occur there. Reptiles appear to be quite absent, with the possible exception of small newts. Of the fishes, of course no fresh-water forms occur, but about the island swarms an extreme abundance of all the valuable salt-water food fishes of the region, cod, pollock, haddock, halibut, mackerel, salmon, etc., so that from the early days of the permanent settlement the island has been a valuable fishing station, and there is a weir for herring upon it at the present day. Amongst the fishes occurs the useless but rather striking sculpin, which seems to have attracted the attention of Champlain, for he represents it upon his map (Fig. 8). Without doubt, this abundance of fish in its waters was one important factor in determining its adoption by de Monts as the site of his settlement of 1604. Passing now to the lower groups of animals, the common field and garden insects occur on the island, though none of them are of especial importance. The mosquitos which so troubled de Monts' party in 1604 are now well-nigh absent and never troublesome in the cleared condition of the island. Of more importance are the marine animals, especially the shell-fish, upon the flats and reefs about the island. In the sand flats occurs a great abundance of good clams, and with them great beds of the common mussels, an animal much eaten in Europe, though little esteemed in this country. The abundance of these forms is emphasized by Champlain [1] and by Lescarbot,[2] and is noted upon Wright's map of 1797 (Fig. 12); and, without doubt, it had much to do with the selection of the island as the site of the settlement in 1604. With these, and on the rocks between tide marks, occur many other forms of lesser economic importance,— three or four forms of sea-snails, limpets, sea-urchins, star-fishes, jelly-fishes, barnacles, and so many others [3] as to make the zoology of the island a very interesting study, and the island itself an excellent situation for some scientific station for the study of marine life. In this connection it is worth noting that there has been found upon the island and in Oak Bay a southern form of star-fish, not elsewhere known in this region north of Casco Bay, which fact, taken with other evidence, proves the former occurrence here of an interesting southern colony of animals now nearly extinct.[4]

---

[1] See his map, Fig. 8.

Natives.— Among the other natural productions of the region we must include its wild men. The Indians of this region were, and are, of the Passamaquoddy tribe, a portion of the race called by Champlain, the Etechmins, and by modern writers, the Abenaki. They have always formed but a sparse population, of mild and inoffensive disposition; and never in the history of the Passamaquoddy region have their hands been raised against the white settlers, French or English. Fear of these Indians, now known to have been groundless, but very real to the French, was one of the causes leading to the selection of the easily defended island by de Monts as the site of his settlement in 1604.

Effect of environment on early history.— We may now summarize briefly the effect of the natural facts and phenomena just considered upon the island's history, which all hinges upon its selection by de Monts as the site of his settlement in 1604, as fully related in the following pages.

Why then was the island selected? In the first place, standing as it does, a small but elevated island all alone in the very middle of a large river, it is a striking place with a distinctive and individual character. Thus it would attract the immediate attention of de Monts, who, for weeks had been searching in rivers and bays for some place of marked individuality as the site of his proposed settlement. The climate at the time of the discovery was perfect, giving no hint of the winter severity. Its situation, moreover, is extremely pleasing, more so, as I believe, than that of any place, not excepting Port Royal (Annapolis Basin), he had met with in his explorations so far, a point of no small importance to the impressionable Frenchman. Examined more closely, the island was found large enough for a settlement, but small enough, and of a nature, to be easily defended from an enemy, especially from the Indians, whose hostility was greatly but needlessly feared, while its situation commanded an extensive view in every direction, making it safe from surprises. Its surface was elevated and healthful and nearly flat, affording a good site for dwellings, while it was covered with the best of timber ready on the ground for use in building. The soil was mostly fertile, promising well for gardens. Its clean sand beaches afforded good landing places for boats, and there was a sheltered harbour for small vessels, while the shores supplied an abundance of edible shell-fish always available, and the sea around swarmed with the most valuable food fishes. The only drawback to the situation visible in the summer was the scarcity of water, and perhaps of fuel; but apparently bountiful supplies of both could readily be brought from the mainland. It is little wonder then, that de Monts chose as the site of his settlement a place which promised so well; and, when tempted to criticize his choice in the light of subsequent events, as it has been the fashion to do from the time of Lescarbot to the present, we should remember that all the indications at the time he had to make his decision were most favourable, and that the causes which resulted in the abandonment of the settlement only developed later and were not indicated by any facts at his command. The settlement was abandoned in 1605, and practically as the result of a single phenomenon, namely, the unusually severe winter of 1604-1605. Had that winter been as mild as many are in this region, the settlers would not have suffered so terribly from cold; they could have been more abroad to the great benefit of their health, and could have caught fish for the betterment of their diet; the ice would not have prevented them from bringing fresh water and wood from the mainland, and the scurvy need not have been fatal had it appeared at all. Had that first winter been a mild one, the settlement would not have been removed to Port Royal; and the St. Croix valley, if not the island itself, would have become the centre of French settlement and power in Acadia. In this case, the subsequent history, and in some small degree the present status, of the St. Croix valley would have been very different. Upon such small accidents does the course of history often turn!

---

[1] See later, page 168.

[2] See later, page 182.

[3] These forms of animal life have been fully treated for this region in various articles in the Bulletins of the Natural History Society of New Brunswick, later mentioned, page 152.

[4] Considered in the aforementioned Bulletin, IX., 1890, page 54.

NAMES.

The island has borne several names,—*Met-a-neg-wis*, *Saincte Croix*, *Bone*, *Dochet* and *Doucett*, *Neutral*, *Big* (or *Great*), *de Monts*, and *Hunt's*, all of them more or less closely interwoven with its history.

Dochet.— (Universally pronounced in the neighbourhood, *Do* [like so] *-shay*, with accent on the first syllable.) This is the name by which it is exclusively known in the St. Croix valley at present, all other names being unknown or merely matter of tradition among the older residents. To ascertain its origin we turn, of course, to early records. The earliest use of this name I can find is in documents of 1797, connected with the boundary disputes, where it appears as *Doceas.*[1] I do not find it again until 1841, when it occurs as *Docias* in a manuscript lecture on New Brunswick History, by Moses Perley, preserved by the New Brunswick Historical Society in St. John, and in the same year, Gesner, the geologist, spelled it *Dochez* in a letter.[2] Next it appears upon Owen's Chart, "Quoddy Hd., to C. Lepreau," of 1848, spelled (for the first time) *Dochet*, and this form is followed upon all charts, both English and American, down to the present day. I find it next on Wilkinson's fine map of New Brunswick of 1859 as *Doucetts*, which is followed as *Doucette* on the Geological Survey Map of Charlotte County of 1880, by Loggie's map of 1884, by New Brunswick Statutes, mentioned below, in 1896 and 1899, and by many other maps and records. Indeed, *Doucetts* has become the recognized spelling in New Brunswick. Such are the facts, but for their interpretation we have the aid only of tradition and inference. The local tradition derives the name from that of a young woman named *Dosia* (Theodosia) formerly associated with the island. The late Peter E. Vose, of Dennysville, Me., a devoted student of local history, wrote me in 1891, quoting an earlier article of his own in the "Eastport Sentinel," that when a boy he had heard from his father the story of a young woman named Dosia who, sometime after the permanent settlement of this part of the river in 1784, used to resort with her lover to the island, to the great scandal of the neighbourhood which thus came to speak of the island as Dosia's. Another form of the story is given by the late Edward Jack, also deeply versed in local history, as follows:[1] "My father told me that a party of young people who were on a picnic at the island early in the present century named it Dosia's Island, because they had seen a very pretty young lady in St. Stephen who was called Theodosia. She was, I believe, a Miss Milberry." Yet another form of the tradition makes her a visitor to, or resident of,[2] the island and attributes to her such great personal beauty as to have led the residents in the vicinity to speak of the island by her name. There are sundry other variants of the tradition, but the foundation of them all, a close connection between a young woman named Dosia (Theodosia) and the island, causing them to be long talked about in the neighbourhood in connection with one another, explains, I believe, the real origin of the name. Dosia is a commonly used contraction for the name Theodosia, and, locally at least in this region, where women still bear the name, it is pronounced as Do-shay, precisely as the name of the island is. Such an origin is in entire accord with the methods by which place-names arise, and it explains perfectly the first use of the word in the form Doceas or Docias. The later variations are easily explained. Captain Owen seems to have originated the form *Dochet*; doubtless he, knowing the early association of the island with the French, supposed the name as locally pronounced to be of French origin, and gave it a French spelling to agree with its pronunciation; and the great influence of his chart, the basis for all those in use to-day, caused this form to be widely adopted.[3] The other form, *Doucette*, originated with Wilkinson in 1859, and, I believe, represents another effort to attribute to the word a French origin, of which there are other examples on Wilkinson's map. It is quite possible that Wilkinson supposed the word had some connection with the name of John Doucett, Lieutenant-Governor of Annapolis Royal in 1718, and this determined his spelling, though on this theory the final e should be absent. Kilby (in his Eastport and Passamaquoddy, page 126), suggests that the island may be named for Lieutenant-Governor Doucett, but there is absolutely no known fact to sustain it, while the fact that the form Doucet or Doucette is not known to occur prior to 1859 is an insuperable objecto it,[1] aside from the fact that the local pronunciation of the word *Doshay*, could hardly have been derived from *Doucett*. A combination of the forms Dochet and Doucette, namely, *Douchet*, is sometimes used, as by Winsor (America, IV., 137), and other variants occur.

---

[1] Document given later on page 200; used as *Docias* in Benson's Report of 1798, mentioned later, page 209.

[2] Cited in the St. Croix Courier Series (on which see later, page 151), No. XXIII.

---

[1] St. Croix Courier Series, No. XXIV.

[2] A fact which may have some significance in this connection is this:—A Miss Milberry, now living in St. Stephen, says that the island once belonged to her grandfather. As shown later in this paper, he could never have been its legal owner, but he may have been an earlier resident than we have other evidence of, in which case Theodosia Milberry may have been a resident on the island.

[3] The final *s* of the word, following the law in such cases, was probably by this time commonly dropped. It is now rarely heard, though old people occasionally use the form *Doshays Island*.

St. Croix, or *Isle Saincte Croix.*— This was the name given it in 1604 by Sieur de Monts, as Champlain's narrative, later cited,[2] records. Champlain does not tell us why the name was chosen but his contemporary, Lescarbot, explains[3] that it was suggested by the resemblance of the meeting of the rivers above the island to a cross (see Fig. 2), and this is fully confirmed by the fact that both Champlain and Lescarbot on their maps give the river *a marked cross* shape (Fig. 7). This name was used in the Jesuit Relations and one or two later documents, cited below (page 196), often abbreviated to Ste. Croix, down to 1632, when it vanished, only to reappear as an alternative name for the island, and usually anglicized to St. (not Ste.) Croix, in connection with the boundary disputes in 1797 (Fig. 12). It lingers upon certain later maps, as on Purdy's "Cabotia" of 1814, and on Bouchette of 1815, and even in deeds, later cited, of 1826 and of 1856, the former of which speaks of the island as commonly called St. Croix Island. But it has not in recent times been in use as the common name of the island. It was, of course, from the island the name was extended to the river, first by Champlain himself.

Some maps show, and records mention another St. Croix Island in this region, namely, Treats Island, near Eastport. The name was improperly used under a misunderstanding, but it long persisted on maps.[4]

Bone.— This name first appears on Wright's fine map of this region made in 1772, on which we find the earliest modern representations of the island, reproduced later in this paper (Fig. 10). The name is further applied to it in sundry documents connected with the boundary discussions of 1796-1798, (misprinted *Bon* and *Boon*), and is on Wright's map of 1797, given herewith (Fig. 12). It persists as late as Bouchette's map of 1831 but then vanishes, and it is now locally unknown even to tradition. We have no facts to explain the origin of the name; but since we now know that the cemetery in which were buried the thirty-five victims of the winter of 1604-1605 has been gradually washed away, it seems not improbable that it was the exposing of their bones which gave origin to the name.

---

[1] It is not necessary to go so far afield or aback to find a Doucet after whom one might claim it to have been named. I am informed by M. Placide Gaudet, our leading Acadian genealogist and historian, that one Charles Doucet, born in 1776, at Baie Ste. Marie, N.S., removed to St. Andrews or vicinity when a young man, and married there a Miss Monroe, and they had several children. But there is nothing to connect him with the island.

[2] Page 155.

[3] Page 180.

[4] It is discussed in these Transactions, VII., ii., 237.

Neutral.—Although not now in use, this name is well known traditionally. I have been told by a very old resident that it originated at the time of the war of 1812, when, as later mentioned (page 213) the British and American vessels met here to exchange their cargoes of plaster, as upon neutral ground. The earliest use of it I have found is in Williamson's History of Maine of 1839, when he says, "the inhabitants often call it Neutral Island." It occurs in the deed later mentioned of 1856, and is mentioned by Kilby and several other writers.

Big (or *Great*).— These forms appear not now to be used, but they occur in deeds of 1820 and 1869, later mentioned (pages 214, 217). The name, of course, was by way of contrast with Little Dochet, these two being the only islands in that vicinity.

De Monts.— This name was formally given in 1866 by officers of the United States Coast Survey, as described on a later page. Parkman in his "Pioneers of France," published the preceding year, speaks of it as De Monts Island, though evidently using the word descriptively and not as a proper name for the island, and it was, perhaps, this use, fresh in their minds, which led the Coast Survey officers to adopt it. I am informed by the Superintendent of the Coast Survey that "Professor Hilgard in 1866 named it DeMonts Island, and for several years subsequently Dochet and DeMonts were used indifferently, but the latter afterwards disappeared entirely from Lighthouse Lists and from Hydrographic Office Charts." I have not seen any chart or other government publication using the name, though it is adopted in Brown's "Coasting Voyages in the Gulf of Maine" (in Collections Maine Historical Society VII). Kilby, in his "Eastport and Passamaquoddy" (page 126), suggests, apparently independently of earlier use, that it should be called DeMonts Island. But the name has never come into use, and is quite unknown locally for the island.[1]

---

[1] The name is, however, coming locally into use for the point at the Devils Head on which the summer cottages are built. A few years ago a small summer hotel was built here in a small new clearing, and named, appropriately, "Hotel De Monts," (shown on Figure 15). It speedily became popular, and cottages were built near it, so that the place in general, which is isolated by a long extent of woods from the highway and other settlements, soon became known locally simply as DeMonts. In 1901 the hotel was burned and has not

Hunts.— This name appears, as far as I can find, but once, and then upon the original plane-table sheet of the survey of this region by the United States Coast Survey, of which the island is reproduced (by permission of the Superintendent of the Survey) in Fig. 13. This name is entirely unknown locally for the island, and on inquiry of the Superintendent of the Coast Survey, I find that nothing is now known in the Survey office as to the reason for its adoption. Though the name is on the original manuscript sheet, it is not on the published map made from it (Fig. 4), and it has vanished completely. Two possible explanations occur for this name: — first, that it was intended to use the name *de Monts* given the island by the Coast Survey in 1866, but that owing to imperfect memory of some person connected with the survey it was put down wrongly as Hunts, and, second, (and more probably) the name was transferred to it by mistake from a ledge on the northwest of the island which is locally often called Hunts ledge (Fig. 3).

Met-a-neg-wis or *Met-neg-wis'* (the *a* being sometimes sounded, sometimes not), the Passamaquoddy Indian name of the island. As to its exact form and significance, Mr. A. S. Gatschet, of the United States Bureau of Ethnology, our best authority upon the Passamaquoddy language, writes me that he derives the name from *Met-negwis,* meaning "the little island at the end" (*met* "at the end," *negwis,* diminutive of *m'niku,* "island"), and he suggests that it may refer to the end of navigation. The great objection to this interpretation is in its inappropriateness; the island is by no means at the end of anything, but rather in the middle of the length and breadth of this estuary. There is, moreover, some evidence looking in another direc-

---

been rebuilt, but the *place* is still referred to as "DeMonts" by the people of Calais and St. Stephen. It will be interesting for the future student of place-nomenclature to observe whether the name becomes persistent.

It may here be noted incidentally that the supposition repeated by Kilby (Eastport and Passamaquoddy, page 126), and which has some local vogue, that Devils Head is a corruption of d'Orvilles (a companion of de Monts at St. Croix Island in 1604) Head, is a pure guess with absolutely no fact whatever from historical documents or maps to support it. On the contrary, the word can be traced back in its present form through numerous maps and documents to 1770, when it appears in the Owen Journal spelled as now. All the probabilities, therefore, are in favour of the belief that this head, very prominent and somewhat treacherous to the sailor because of the squalls which sometimes sweep down from it, was named the "Devils" precisely as innumerable other places in this region, of a somewhat uncanny nature, are named for him. Another origin, equally foundationless, for the word, is given locally, that it is for a man named Duval who once lived behind it. As above shown, the word goes back in its present form long prior to any settlement in this vicinity, which did not begin until after 1783.

tion. I have myself obtained the name from a Passamaquoddy in the form *Mut-on-a'g-wes*, which he defined as "little wild island," probably simply at random. The name occurs several times among the MS. of the boundary Commission, later described (page 189) in testimony taken from Indians in 1796-1797. One Indian gave the name as "*Matnagwish.* It was so called because they left their stores, etc., there when they went a-hunting, as no Bears or other wild beasts sat down there." Another gave it as "*Muttanagwis,* . . . which signifies a place like a store or chest," while a third gives "*Muttanegwiss,* because a place where a store to deposit things."[1] This agreement of the three Indians, apparently examined separately, is important in its bearing upon the true meaning of the word, which, however, I cannot further explain.

Of the names placed upon my modern map (Fig. 14), some explanation may be given. *Triangle Cove* and *Sand Point* are taken from Wright's map (Fig. 12), though the former seems to be unknown locally. *Treats Cove* is used locally and is, no doubt, for the fisherman who worked on the island in early days, as later mentioned (page 215). *Hunts Ledge* is used locally, but I do not know its origin. The two partially isolated islets at the south of the island are locally called *Nubbles,* and I have named one *Chapel Nubble,* because nearly on it stood the Indian chapel built by de Monts (Figs. 8, 14), and the other, *Wright's Nubble,* since it is first shown isolated from the main island on Wright's map, for on Champlain's it is a part of the main island (Fig. 14). When other names are needed for places on the island, or, indeed, for other places in the vicinity, or even for estates, hotels, clubs, yachts of the neighbourhood, they may well be drawn from some of those of the companions of de Monts, later mentioned in this paper.

MAPS.

The existent maps of the island fall into two classes: — first, special maps of the island itself, and second, general maps of the region upon which it appears incidentally.

Of the former I have been able to find but five, four of which are reproduced in this paper; first, Champlain's of 1604 (Fig. 8); second, Wright's of 1797 (Fig. 12); third, one made by the United

---

[1] Compare also Kilby's "Eastport and Passamaquoddy," pages 116 and 488. The name of Little Dochet is given in the testimony as *Muttinagwenish,* or *Muttanagwamis,* evidently a diminutive of the name of the larger island (rather implying that the name of the latter is not a diminutive, as Mr. Gatschet's explanation supposes), and once the two are transposed, doubtless by an error in taking them down, as they are on Carleton's map of Maine, 1802.

States Coast Survey in 1885 (Fig. 13); fourth, one made by the present writer from survey in 1898, and published in the Transactions of the Royal Society of Canada, new series, Vol. V, section ii., page 265; and fifth, one made by the writer from a new survey in September, 1902, and here (Fig. 3) published for the first time. Owing to an inaccuracy in the compass used in the 1898 survey (a nickel-plated instrument found subsequently to give 5° of error in some positions) that map was inaccurate in details of its shape; and, in consequence, it is intended to be superseded by the new map herewith presented (Figs. 3 and 14). Repeated inquiry in various directions, locally and in the Maine State and the Massachusetts Land Offices, has failed to show the existence of any other maps of the island.

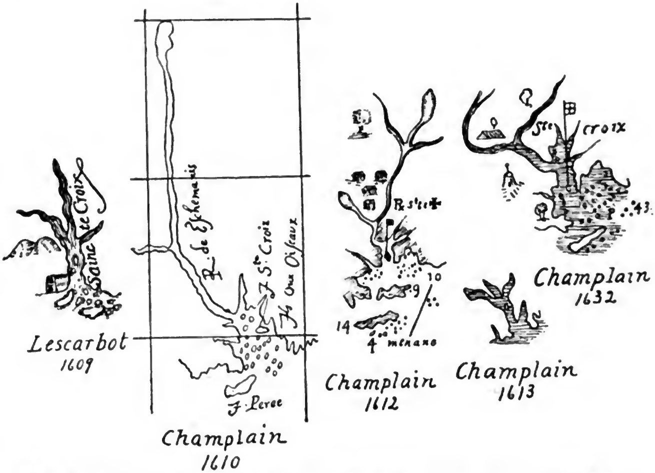


FIG. 7.—All of the known early maps showing Dochet (St. Croix) Island, with the St. Croix River. Original size.

Of general maps of the region on which the island is shown, the first is that of Champlain, dated 1610, of which the St. Croix portion is reproduced herewith (Fig. 7),[1] and it appears again in somewhat different form on his maps of 1612, 1613 and of 1632 (Fig. 7), in two of these marked by the standard indicating a French settlement. It appears also on Lescarbot's earlier map of 1609, but unnamed (Fig. 7). Subsequent maps of the region become much distorted, and the island does not appear, at least recognizably, upon any other map down to 1772, when it appears with the name Bone Island on Wright's great survey map, a portion of which is here reproduced from the MS. in the Public Record Office in London (Fig. 10). It appears with its Indian name on Carleton's Map of Maine of 1802, though with its name and that of Little Dochet transposed. From 1772 down to the present it appears upon all maps of large scale, sometimes named and sometimes not, reaching its most detailed representation upon the United States Coast Survey Chart of 1895 (No. 300), of which a portion is here reproduced (Fig. 4), and this is the largest-scale published map of the island, aside, of course, from the special maps earlier mentioned.

---

[1] The Lescarbot map is from the 1609 edition of his "Histoire de la Nouvelle France": the 1610 Champlain map is from the copy in Brown's "Genesis of the United States"; the 1612 and 1613 Champlain maps are from the

LITERATURE.

The history of Dochet Island has been of such interest, and, in connection with the boundary disputes, of such importance as to give rise to a considerable literature. This may be divided into five classes: — (1) original historical narratives and other documents, (2) references in general historical works, (3) scientific literature, (4) popular accounts in newspapers and other fleeting sources, and (5) pure literature, romance, and poetry.

First, we consider the original historical publications. Of these, by far the most important is "Les Voyages dv Sievr de Champlain," written by Samuel de Champlain, companion of de Monts in 1604, and published as a quarto at Paris in 1613. This work is now very rare and costly, but is accessible in the edition of Champlain's writings published at Quebec in 1870, under the editorship of Abbé Laverdière, a work whose faithful reproduction of the original text (marred only by the crudeness of reproduction of some of the illustrations), and scholarly annotations make it one of the monuments of Canadian scholarship. From this the text in the following pages is taken. There is also an edition of Champlain's works published in 1632, reprinted in a valueless edition at Paris in 1832, and with fidelity in the Quebec edition of 1870, which contains an abbreviated account of the island and its discovery, but omits the account of the settlement. Champlain's "Voyages" of 1613 has been translated into

---

"Voyages" of 1613, and the 1632 Champlain is from the 1632 edition of his works. I have a copy of a 1607 or 1608 map of the St. Croix by Champlain (given me by Mr. Henry Harrisse), but it does not show the island.

English by Dr. C. P. Otis, annotated by Rev E. F. Slafter, and published at Boston in 1878-1882 by the Prince Society, an extremely good work with photographic reproductions of the illustrations; this translation I have used as a basis for that in the following pages, not hesitating, however, to alter it whenever, which was rarely, I thought it could be improved.

There is, however, an earlier account of the voyage and settlement of 1604 which, as Parkman has said, may have been written by Champlain himself,— namely, that in *Le Mercvre François*, a contemporary French journal for 1608, published in 1611, and this is reproduced later in this paper, together with a translation based upon that given in the Magazine of American History, Vol. II., 49. Second in importance to Champlain's works comes the "Histoire de la Nouvelle France," published in 1609 by Marc Lescarbot, a lawyer of Paris, who spent the years of 1606-1608 in Acadia, and visited the island in 1607. He obtained his facts, of course, from Champlain, with whom he passed a winter at Port Royal, and upon some matters he gives more information than does Champlain himself. New editions of his "Histoire" were published in 1611, 1612 and 1618, and that of 1612, which is followed in the text later in this paper, has been reprinted, not in fac-simile, but somewhat modernized, by Tross at Paris in 1866. The different editions not only differ from one another in the amount of material included, but they also vary considerably in the details of the text,[1] although, so far as the parts relating to St. Croix Island are concerned, the differences appear to be merely in diction and not to involve any change of meaning or additional matter.[2] The parts of Lescarbot's work relating to de Monts' voyage and settlement were translated into English by a clergyman named Pierre Erondelle, and published at London in 1609 under the title "Nova Francia; or the Description of that part of New France which is one continent with Virginia . . . . " I have used this quaint and interesting translation, which I was tempted to reproduce here exactly, in making the translation given later in this paper. This translation of Erondelle's is given, abbreviated, in Purchas' "Pilgrims," Vol. IV., and in full in Churchill's Collections of Voyages, Vol. VIII. The only other printed original documents relating to the earlier periods of the island's history are contained in the Relations of the Jesuit Missionaries, which have recently been collected and republished in original and translation in seventy-three volumes under the editorship of R. G. Thwaites, a monumental work of research and scholarship. The citations in this paper are from that edition. The documents bearing upon the later history of the island are mostly still in Ms. in the voluminous records of the Boundary Commission, which will be found described later in this paper.

---

[1] On the different editions, consult Biggar, "The French Hakluyt, Marc Lescarbot of Vervins," in American Historical Review, VI., 671-692.

Full bibliographical details of the works of Champlain and Lescarbot are given by Winsor in Chapters III. and IV. of Vol. IV. of his "America."

[2] As shown by a comparison of the three editions made for me by my friend, Mr. Victor H. Paltsits, of the Lenox Library.

Passing next to books of history, we note that all works treating the history of Canada, or this part of America, necessarily make some mention of the history of the island. Such references are well-nigh innumerable, but not always accurate, and need not be considered further here. Works of more limited range, those relating to Maine and to the Acadian Provinces naturally give more detailed accounts, and such narratives are to be found in Haliburton's Nova Scotia (1829), Murdoch's Nova Scotia (1865), Hannay's Acadia (1879), Weston's Maine (1834), Williamson's Maine (1839), Willis's Early Collections of Voyages to America, in the New England Historical and Genealogical Register, XV., 1861, 212-213, Parkman's Pioneers of France in the New World (1865), Brown's Coasting Voyages in the Gulf of Maine, (Collections of the Maine Historical Society, VII., 1873, 243), and there is a treatment of it, with reproductions of the maps, in the section on Acadia in Vol IV. of Winsor's "Narrative and Critical History of America," (1884). Dionne's Samuel Champlain (1891) treats it fully, but with no new information. It is synoptically, but not very accurately considered in a local work, Knowlton's "Annals of Calais, Maine and St. Stephen, New Brunswick," 1875; it is considered briefly, with the cut of the settlement by Kilby in his Eastport and Passamaquoddy (1888); is discussed very fully and with a translation of Champlain's narrative and reproduction of his map of the settlement in Nos. XXIII.— XXVI. of the very valuable series of historical articles, edited by James Vroom, in the "St. Croix Courier," published at St. Stephen, in 1892-1895. More recently it has been briefly treated, with a cut of the settlement-map, by Hay in his "Canadian History Readings" (1900). The interesting questions as to the identity of the island, its names, etc., have received some attention from several writers, and there are notes on the subject in Holmes' "Annals," I., 149 (I., 122 of 2nd Edition), in Williamson's History of Maine (I., 88, and II., 578), in Laverdière's, and in Otis-Slafter's editions of Champlain, in Winsor's "America," IV., 137, and in Thwaites' Jesuit Relations, II., 291. From the point of view of the identification of the site of the settlement, etc., I have treated the subject, with reproductions of three maps, in my "Historic Sites in

New Brunswick" in these Transactions, V., section II., 262-266. The part played by the island in the Boundary controversies is touched upon in several of the above works, and the subject is very fully summarized in my "Monograph of the Evolution of the Boundaries of the Province of New Brunswick," published in Vol. VII. of the Transactions of the Royal Society of Canada.

Of scientific literature relating to the island there is extremely little, and it has been referred to in the preceding pages. The Geological map of Charlotte County colours the island for the Silurian formation, though, as already pointed out, erroneously, but the accompanying reports make no mention of it. Brief references to the molluscs, etc., which occur there, in identification of those mentioned by Champlain and Lescarbot, are given by the present writer in the Bulletins of the Natural History Society of New Brunswick, (No. VI., page 17; No. VII., page 14, and No. VIII., pages 4-6, 16), while a reference to a southern star-fish occurring there occurs in the same Bulletin, No. IX., page 54. Other than these, I can find no references to the island in scientific literature.

Of more fleeting literature in newspapers there has been an abundance. The island being one of the chief local attractions, is visited by many tourists and an occasional reporter every summer, and some of these on their return home publish their experiences in the newspapers. Such narratives are sometimes grotesquely inaccurate, and abound in characteristic exaggerations, and they have no permanent value. One of the first of such articles is said locally to have been published in the New York *Sun* some forty years ago, and is worth note because it reproduced the two maps of Champlain, and became a chief source of information locally about the island. An interesting reference to a visit to it occurs in a book for children, "All Among the Lighthouses," by Mary Crowinshield (Boston, 1886), pages 339-343.

Of pure literature the island has almost none. No romance has been woven from its story, though its subject offers tempting opportunity, and it has inspired but two short poems, one, an Ode to de Monts, written by Lescarbot on his voyage to the island in 1607, and contained in his "Muses de la Nouvelle France,"[1] and A. W. H. Eaton's *St. Croix Isle* in his "Acadian Legends and Lyrics." Opinions will differ as to the merits of the latter, and its many inaccuracies mar its application to the place. In time to come, perchance, the imagination of novelist or poet will take up the theme where the historian has left it: — may the result then be worthy of the subject!

---

[1] Given in the Tross edition, Vol. III., page 45, of the "Muses." There is in this work also an ode to de Monts and his associates, and sonnets to Champlain, Poutrincourt, and Champdoré.

HISTORY.

The history of Dochet Island falls naturally into four periods: —

First,— its settlement by de Monts in 1604, and events to the grant of Razilly in 1632.

Second,— its part in the boundary controversies and in the determination of the River St. Croix in 1796-1799.

Third,— its modern history from the first permanent settlement of the St. Croix to the present.

Fourth,— its probable and desirable future.

1. THE DISCOVERY AND SETTLEMENT OF ST. CROIX (DOCHET) ISLAND IN 1604, AND SUBSEQUENT EVENTS TO 1632.

The opening of the year 1604 found not a single European settled amid the endless forests of the northern parts of North America. Attempts at colonization had been made, it is true, but all had proved abortive. The very ownership of the country was in dispute, for England claimed it all by right of the discoveries of the Cabots, while France maintained a right to the same region by virtue of the later and better known discoveries of Verrazano. Such were the conditions when, in 1603, the Sieur de Monts, an energetic and prominent soldier and gentleman of France, proposed to the King of France to found a colony in Acadia, offering to bear all of the expenses if he could be given as compensation a monopoly of the fur trade. This was readily granted, and the Sieur de Monts, in addition to receiving the monopoly, was made Lieutenant-General of the King for the country of Acadie, a region covering the Atlantic coast of North America from latitude 40° to 46°, or from Philadelphia to Cape Breton (Fig. 1). Accordingly, early in 1604, de Monts brought together a company of 120 men, some of them gentlemen in search of adventure, some of them artizans and other workmen, together with abundant stores and equipment for a permanent settlement, and embarked them upon two vessels, one of 120 and the other of 150 tons. With him as King's Geographer, and, as it proved, historian of the expedition, went Samuel de Champlain, a great man, afterwards the Father of New France. The vessels reached Acadia in safety in May, and, after sundry adventures and explorations, the vessel containing de Monts and Champlain reached St. Mary's Bay in Nova Scotia on

June 16th, the other vessel, commanded by Sieur de Pont Gravé, remaining at Canso. Embarking in a smaller boat, apparently a barque of eight tons, with a few men, de Monts and Champlain proceeded to explore the Bay of Fundy, hitherto unknown to Europeans, discovering Port Royal and Annapolis Basin, passing around the head of the Bay of Fundy, and entering the mouth of the St. John on June 24th. Then they kept on to the westward, passing the islands we now call the Wolves, and entering Passamaquoddy Bay, through which they passed. But from this point on we shall allow Champlain to tell the story as he has written it in his own book.[1]

CHAPITRE III.

. . . . nous en[32]trasmes dans vne riuiere qui a presque demye lieue de large en son entrée, où ayans faict vne lieue ou deux, nous y trouuasmes deux isles: l'vne fort petite proche de la terre de l'ouest: & l'autre au milieu, qui peut auoir huict ou neuf cens pas de circuit, esleuée de tous costez de trois à quatre toises de rochers, fors vn petit endroict d'vne poincte de Sable & terre grasse, laquelle peut seruir à faire briques, & autres choses necessaires. Il y a vn autre lieu à couuert pour mettre des vaisseaux de quatre vingt à cent tonneaux: mais il asseche de basse mer. L'isle est remplie de sapins, boulleaux, esrables & chesnes. De soy elle est en fort bonne situation, & n'y a qu'vn costé où elle baisse d'enuiron 40. pas, qui est aisé à fortifier, les costes de la terre ferme en estans des deux costez esloignées de quelques neuf cens à mille pas. Il y a des vaisseaux qui ne pourroyent passer sur la riuiere qu'à la mercy du canon d'icelle Qvi est le lieu que nous iugeâmes le meilleur: tant pour la situation, bon pays, que pour la communication que nous pretendions auec les sauuages de ces costes & du dedans des terres, estans au millieu d'eux: Lesquels auec le temps on esperoit pacifier, & amortir les guerres qu'ils ont les vns contre les autres, pour en tirer à l'aduenir du seruice ; & les reduire à la [33] foy Chrestienne. Ce lieu est nommé par le sieur de Mons l'isle saincte Croix. Passant plus outre on voit vne grande baye en laquelle y a deux isles: l'vne haute & l'autre platte: & trois riuieres, deux mediocres, dont l'vne tire vers l'Orient & l'autre au nord: & la troisiesme grande, qui va vers l'Occident. C'est celle des Etechemins, dequoy nous auons parlé cy dessus. . . . .

---

[1] The reader who may be interested in knowing more of the lives and personalities of Champlain and de Monts may find accounts of them in the following sources. Of Champlain, there is a full account, with a portrait, in Chapter III. of Vol. IV. of Winsor's "America"; others are in the Otis-Slafter Translation, in the Quebec edition of Champlain's works, in Dionne's Samuel Champlain and elsewhere. As to de Monts, there are references and a reproduction of a possible portrait in Chapter IV. of Vol. IV. of Winsor's "America," and a mention of him by Dionne in the preceding volume of these Transactions, section i., 40. There is a portrait of him in the Gilbert Parker collection at Queen's University Library, which, is, I am informed, from the same original as that given by Winsor.

The text of Champlain following is from the Quebec edition of 1870, but with the chapter headings and pages added from the original edition of 1613.

TRANSLATION.

CHAPTER III.

. . . . *St. Croix Island, and other noteworthy objects on this coast.*

. . . . we entered a river almost half a league in breadth at its mouth,[1] sailing up which a league or two we found two islands: one very small[2] near the western bank: and the other[3] in mid-river, having a circumference of perhaps eight or nine hundred paces,[4] with rocky sides three or four fathoms[5] high all around, except in one small place,[6] where there is a sandy point and clayey earth adapted for making brick and other needful articles. There is another place affording a shelter for vessels from eighty to a hundred tons: but it is dry at low tide.[7] The island is covered with firs, birches, maples and oaks.[8] It is by nature very well situated, except in one place, where for about forty paces it is lower than elsewhere:[9] this, however, is easily fortified, the banks of the main land being distant on both sides some nine hundred to a thousand paces.[10] Vessels could pass up the river only at the mercy of the cannon on this island, and we deemed the location the most advantageous, not only on account of its situation and good soil, but also on account of the intercourse which we proposed with the savages of these coasts and of the interior, as we should be in the midst of them. We hoped to pacify them in the course of time and put an end to the wars which they carry on with one another, so as to derive service from them in future, and convert them to the Christian faith. This place was named by Sieur de Monts Saint Croix Island.[11] Farther on there is a great bay, in which are two islands, one high and the other flat;[12]

---

[1] Now the St. Croix, with its mouth at Joes Point (Fig. 2).

[2] Now Little Dochet (Fig. 2).

[3] Now Dochet, the subject of this Monograph (Fig. 2).

[4] The distance is about exact, as the island was at that time.

[5] The fathom was rather more than ours, being nearly seven feet (compare the scales on Wright's map, Fig. 12).

[6] This point no doubt would be that shown on Champlain's map (Fig. 8) as mounted with two cannon. Here as comparison with the modern map will show (Fig. 14), the rocks are wanting and there is a sandy beach.

[7] This is Treats Cove (Fig. 3), altered considerably from its appearance at the time of Champlain, but still forming such a harbour as he describes. I have been told by a former resident of the island, that, before the sand was removed between the main island and the Chapel Nubble, this was a most charming harbour, protected by high banks all around. Compare Wright's map (Fig. 12), where it is very clearly shown. The bottom is of sand, and so smooth that small vessels can lie in perfect safety upon it as the tide falls.

[8] Oaks are not now found among the few trees on the island, though Wright found one tree in 1797 (see later, page 204). The others here mentioned still occur on the island (compare page 139).

[9] This refers, I believe, to the part of the island on the south-west shore, where it slopes almost to the water's edge.

[10] In a general way these distances are about correct, though Champlain's own map (Fig. 8), being for a special reason (elsewhere explained, page 156), much distorted in this respect, makes it much less.

[11] This name was suggested by the meeting of the rivers above the island in the form of a cross, as earlier (page 144) explained.

[12] Oak Bay, with the lofty Cooksons Island, some 300 feet in height, and the low sandy Little Island. (Fig. 2).

also three rivers, two of moderate size, one extending towards the east,[1] the other towards the north,[2] and the third of large size, towards the west.[3] The latter is that of the Etechemins, of which we spoke before. . . .

EXPLANATIONS OF CHAMPLAIN'S MAP OF ST. CROIX ISLAND, 1604-5 (FIG. 8).

ORIGINAL.	TRANSLATIONS (*and notes*).
Les chifres montrent les brasses d'eau.	*The figures indicate fathoms of water.*
A. Le plan de l'habitation.	A. A plan of the settlement. (*Compare also Fig. 9.*)
B. Iardinages.	B. Gardens.
C. Petit islet seruant de platte forme à mettre le canon.	C. Little islet serving as a platform for cannon. (*This islet is now washed away.*)
D. Platteforme où onmettoit du canon.	D. Platform where cannon were placed.
E. Le cimetiere.	E. The Cemetery. (*Now washed away.*)
F. La chappelle.	F. The Chapel. (*On the present Chapel Nubble, or nearly.*)
G. Basses de rochers autour de l'isle saincte Croix.	G. Rocky shoals about Sainte Croix Island.
H. vn petit islet.	H. A little islet. (*Little Dochet.*)
I. Le lieu où le sieur de Mons auoit fait commencer vn moulin à eau.	I. Place where Sieur de Monts had a water-mill commenced. (*On Lows Brook.*)
L. Place où l'on faisoit le charbon.	L. Place where we made our charcoal. (*Beside Beaver Lake Brook.*)
M. Iardinages à la grãde terre de l'Ouest.	M. Gardens on the western shore. (*In a charming situation, easily recognizable, east of Red Beach.*)
N. Autres iardinages à la grande terre de l'Est.	N. Other gardens on the eastern shore. (*Beside the small stream emptying into Johnsons Cove.*)
O. Grande montaigne fort haute dans la terre.	O. Very large and high mountain on the main land. (*McLaughlans Mountain.*)
P. Riuiere des Etechemins passant au tour de l'isle saincte Croix.	P. River of the Etechemins flowing about the Island of St. Croix.[4]

---

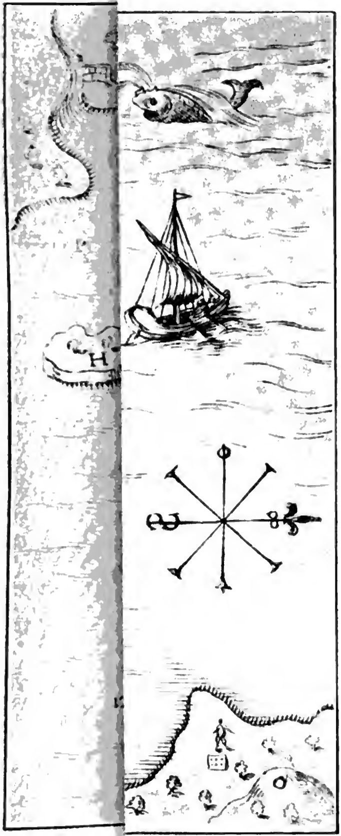
[1] The Waweig.

[2] Oak Bay, with the small stream (Gallops Stream) emptying into its head.

[3] The St. Croix above the Devils Head (Fig. 2). Champlain repeatedly calls it "River of the Etechemins," which name persisted on a few maps down to Denys, 1672, and then vanished. It was called by the Indians the *Scoodic*, and to some extent the name is still in use.

[4] For the location of the various places on the island in comparison with the modern topography consult Fig. 14.

While the proportions of the island are fairly good in this map, the shores of the mainland (compare figs. 4, 10 and 11) are brought far too near, of course in order to keep the map a convenient size. It is adjusted to the magnetic meridian, and the scale, as to the island, is about 250 feet to the inch. The


H
O

Here follows a description of the falls in the River of the Etechemins (St. Croix), with mention of the portages to the Norumbegue (Penobscot) and St. John, and of the fishing and soil, and of the planting of wheat there, and some minor matters, not connected with St. Croix Island.

Ce lieu est par la hauteur de 45. degrez vn tiers de latitude, & 17. degrez 32. minuttes de declinaison de la guide-ayment.

TRANSLATION.

This place is in latitude 45° 20′, and 17° 32′ of the variation of the magnetic needle.[1]

---

vessels represented are doubtless that in which de Monts came to America, with the barque in which he and Champlain were exploring when they discovered the island. The animals represented are the whale and two porpoises, which are unmistakable (and still to be seen at times around the island), and a third kind of creature which seems to represent the fish called the sculpin more nearly than anything else that lives in this region. The meaning of the seated man near the ledges at the south of the island, I do not understand; the place is only uncovered at low tide. Nor is the meaning of the figure of a man, with apparently a clearing beneath him, evident, unless it means that the Indians had a small clearing as a sort of lookout on the bluff at Sandy Point. The depths given are too little (compare Fig. 4).

[1] Although he has been speaking of the falls on the River of the Etechemins, he must in this sentence refer to St. Croix Island, because the determination of latitude and magnetic variation require some time and care which he could give in the settlement on the island, and would not be likely to give on his hasty visits to the much less important place at the falls. His latitude, though somewhat too great (it is really 45° 07′ 44″), is yet, considering the imperfection of the instruments of the time, remarkably accurate. The variation of the magnetic needle at the island is now (1902) somewhat over 18° 30′, and increasing slightly, west of north. Various early surveys, by Wright, 1772, and others later, show that it was from 13° to 14° W. somewhat over a century ago. Champlain's observation here given is, of course, much the earliest on record for this region. A very curious fact about Champlain's observations is that they show an increase in the variation from the east westward, thus seeming to imply that the variation was then to the eastward, and not to the westward. The subject has been carefully studied by C. A. Schott, for the United States Coast Survey, with results published in the eighth edition of his "Secular Variation of the Earth's magnetic force in the United States and in some adjacent foreign countries," in the Report of the Coast Survey for 1895. He comes to the conclusion that Champlain's determinations are as much as 6° in error, and not to be depended upon within that amount. The variation must then have been west, and it still remains unexplained how Champlain could have found the angle increasing to the westward. In a treatise on his two maps given at the end of his "Voyages," Champlain explains, with a diagram, his mode of finding the true meridian, a mode simple and crude enough, but doubtless the best available to travellers at that time.

[35] *LE SIEUR DE MONS NE TROUUANT POINT de lieu plus propre pour faire vne demeure arrestée que l'isle de S. Croix, la fortifie & y faict des logements. Retour des vaisseaux en France, & de Ralleau Secretaire d'iceluy sieur de Mons, pour mettre ordre à quelques affaires.*

CHAPITRE IV.

N'AYANT trouué lieu plus propre que ceste Isle, nous commençames à faire vne barricade sur vn petit islet vn peu separé de l'isle, qui seruoit de platte-forme pour mettre nostre canon. Chacun s'y employa si vertueusement qu'en peu de temps elle fut rendue en defence, bien que les mousquittes (qui sont petites mouches) nous apportassent beaucoup d'incommodité au trauail: car il y eust plusieurs de nos gens qui eurent le visage si enflé par leur piqueure qu'ils ne pouuoient presque voir. La barricade estant acheuée, le sieur de Mons enuoya sa barque pour aduertir le reste de nos gens qui estoient auec nostre vaisseau en la baye saincte Marie, qu'ils vinssent à saincte Croix. Ce qui fut promptement fait: Et en les attendant nous passames le temps assez ioyeusement.

Quelques iours aprés nos vaisseaux estans arriuez, & ayant mouillé l'ancre, vn chacun descendit à terre : puis sans perdre temps le sieur de Mons commança à employer les ouuriers à [36] bastir des maisons pour nostre demeure, & me permit de faire l'ordonnance de nostre logement. Aprez que le sieur de Mons eut prins la place du Magazin qui contient neuf thoises de long, trois de large & douze pieds de haut, il print le plan de son logis, qu'il fit promptement bastir par de bons ouuriers, puis aprés donna à chacun sa place: & aussi tost on commença à s'assembler cinq à cinq & six à six, selon que l'on desiroit. Alors tous se mirent à deffricher l'isle, aller au bois, charpenter, porter de la terre & autres choses necessaires pour les bastimens.

Cependant que nous bastissions nos logis, le sieur de Mons depescha le Capitaine Fouques dans le vaisseau de Rossignol, pour aller trouuer Pontgraué à Canceau, afin d'auoir ce qui restoit des commoditez pour nostre habitation.

Quelque temps aprés qu'il fut parti, il arriua vne petite barque du port de huict tonneaux, où estoit du Glas de Honfleur pilotte du vaisseau de Pontgraué, qui amena auec luy les Maistres de nauires Basques qui auoient esté prins par ledit Pont en faisant la traicte de peleterie, comme nous auons dit. Le sieur de Mons les receut humainement & les renuoya par ledit du Glas au Pont auec commission de luy dire qu'il emmenast à la Rochelle les vaisseaux qu'il auoit prins, afin que iustice en fut faicte. [37] Cependant on trauailloit fort & ferme aux logemens: les charpentiers au magazin & logis du sieur de Mons, & tous les autres chacun au sien; comme moy au mien, que ie fis auec l'aide de quelques seruiteurs que le sieur d'Oruille & moy auions; qui fut incontinent acheué; où depuis le sieur de Mons se logea attendant que le sien le fut. L'on fit aussi vn four, & vn moulin à bras pour moudre nos bleds, qui donna beaucoup de peine & trauail à la pluspart, pour estre chose penible. L'on fit aprés quelques iardinages, tant à la grande terre que dedans l'isle, où on sema plusieurs sortes de graines, qui y vindrent fort bien, hormis en l'isle: d'autant que ce n'estoit que Sable qui brusloit tout, lors que le soleil donnoit, encore qu'on prist beaucoup de peine à les arrouser.

[39] Quelques iours aprés le sieur de Mons se delibera de sçauoir où estoit la mine de cuiure franc qu'auions tant cherchée: Et pour cest effect m'enuoya auec vn sauuage appellé Messamoüet, qui disoit en sçauoir bien le lieu. Ie party dans vne petite barque du port de cinq à six tonneaux, & neuf matelots

auec moy. A quelque huict lieues de l'isle, tirant à la riuiere S. Iean, en trouuasmes vne de cuiure, qui n'estoit pas pur; neantmoins bonne selon le rapport du mineur, lequel disoit que l'on en pourroit tirer 18. pour cent. Plus outre nous en trouuasmes d'autres moindres que ceste cy. Quand nous fusmes au lieu où nous pretendions que fut celle que nous cherchions le sauuage ne la peut trouuer; de sorte qu'il fallut nous enreuenir, laissant ceste recerche pour vne autre fois.

Comme le fus de retour de ce voyage, le sieur de Mons resolut de renuoyer ses vaissaux en France, & aussi le sieur de Poitrincourt qui n'y estoit venu que pour son plaisir, & pour recognoistre de païs & les lieux propres pour y habiter, selon le desir qu'il en auoit: c'est pourquoy il demanda au sieur de Mons le port Royal, qu'il luy donna suiuant le pouuoir & commission qu'il auoit du Roy. Il renuoya aussi Ralleau son Secretaire pour mettre ordre à quelques affaires touchant le voyage; lesquels par-[40]tirent de l'isle S. Croix le dernier iour d'Aoust audict an 1604.

TRANSLATION.

CHAPTER IV.

Sieur de Monts, finding no place better adapted for a permanent settlement than the island of St. Croix, fortifies it and builds dwellings. Return of the Vessels to France, and of Ralleau, Secretary of Sieur de Monts, for the purpose of arranging some business affairs.

Having found no more suitable place than this island, we commenced making a barricade on a little islet[1] a short distance from the island, which served as a station for placing our cannon. All worked so energetically that in a little while it was put in a state of defence, although the mosquitoes

---

[1] At a first glance, the islet here mentioned would seem to be the Nubble, named on our maps (Fig. 3, 14) Wrights Nubble, and such was formerly my own opinion (expressed in my "Historic Sites of New Brunswick," in these Transactions, V., section ii., 263). But a more thorough study of the subject, especially as based upon a comparison of Champlain's and the modern maps reduced to the same scale and superposed (Fig. 14) has convinced me that the present Wrights Nubble is a remnant of the point on Champlain's map, and that the islet on which his cannon were placed was farther to the southward, and is now entirely washed away. If this is not the case, and the present Wrights Nubble is the one on which de Monts placed his cannon, Champlain's map must be distorted in its southern part to a degree quite impossible to believe of so skilled a cartographer. My present interpretation allows the maps to be harmonized perfectly, and it is confirmed by the relation of Wrights Nubble to the ledge on the southeast of the island (the one near the point with the two cannon on Fig. 8). The reason why the present Nubble has been preserved, while all the intermediate part of the island has been washed away is very plain ; the Nubble is protected by the rock on which it rests which rises above the highest tides, while in the intermediate part the rock is wanting and the sea now washes directly against the soft soil, easily undermining it. It is to be remembered that the island stood some feet higher in Champlain's time (page 136).

Champlain's map seems to show the little islet on which the cannon were mounted as united by a narrow neck with the main island, but in his text, (which are little flies) annoyed us excessively in our work:[1] there were several of our men whose faces were so swollen by their bites that they could scarcely

EXPLANATIONS OF CHAMPLAIN'S VIEW OF DE MONTS' SETTLEMENT ON ST. CROIX ISLAND, 1604-5. (FIG. 9.)

	ORIGINAL.		TRANSLATION.
A.	Logis du Sieur de Mons.	A.	Dwelling of Sieur de Monts.
B.	Maison publique où l'on passoit le temps durant la pluie.	B.	Public building where we spent our time when it rained.
C.	Le magasin.	C.	The storehouse.
D.	Logement des suisses.	D.	Dwelling of the Swiss.
E.	La forge.	E.	The blacksmith shop.
F.	Logement des charpentiers.	F.	Dwelling of the carpenters.
G.	Le puis.	G.	The Well.
H.	Le four où l'on faisoit le pain.	H.	The oven where the bread was made.
I	La cuisine.	I.	Kitchen.
L.	Iardinages.	L.	Gardens.
M.	Autres Iardins.	M.	Other gardens.
N.	La place où au milieu y a vn arbre.	N.	Place in the centre where a tree stands.
O.	Palissade.	O.	Palisade.
P.	Logis des sieurs d'Oruille, Champplain & Chandoré.	P.	Dwellings of the Sieurs d'Orville, Champlain and Champdoré.
Q.	Logis du sieur Boulay, & autres artisans.	Q.	Dwelling of sieur Boulay, and other artisans.
R.	Logis où logeoient les sieurs de Genestou, Sourin & autres artisans.	R.	Dwelling where the sieurs de Genestou, Sourin, and other artisans lived.
T.	Logis des sieurs de Beaumont, la Motte Bourioli & Fougeray.	T.	Dwelling of the Sieurs de Beaumont, la Motte Bourioli, and Fougeray.
V.	Logement de nostre curé.	V.	Dwelling of our curate.
X.	Autres Iardinages.	X.	Other gardens.
Y.	La riuiere qui entoure l'isle.	Y.	The river surrounding the island.

For the position of the settlement in relation to the modern topography of the island, as nearly as they can be harmonized, consult Fig. 14. This view, and the plan on the map of the island (Fig. 8), while agreeing in general, do not harmonize in details.

---

in chapter IV., he speaks of it as "a little islet a short distance from the island," and Lescarbot speaks of it in the same way; hence we may infer that, despite the appearance on Champlain's map, this islet was then partially separated from the main island, probably with a "saddle" or dip between them, extending down a few feet but not to the beach.

[1] It is likely that the black flies rather than the true mosquitoes are meant. In the present cleared condition of the island, neither mosquitoes nor black flies are ever troublesome, though the tiny midges are somtimes so.

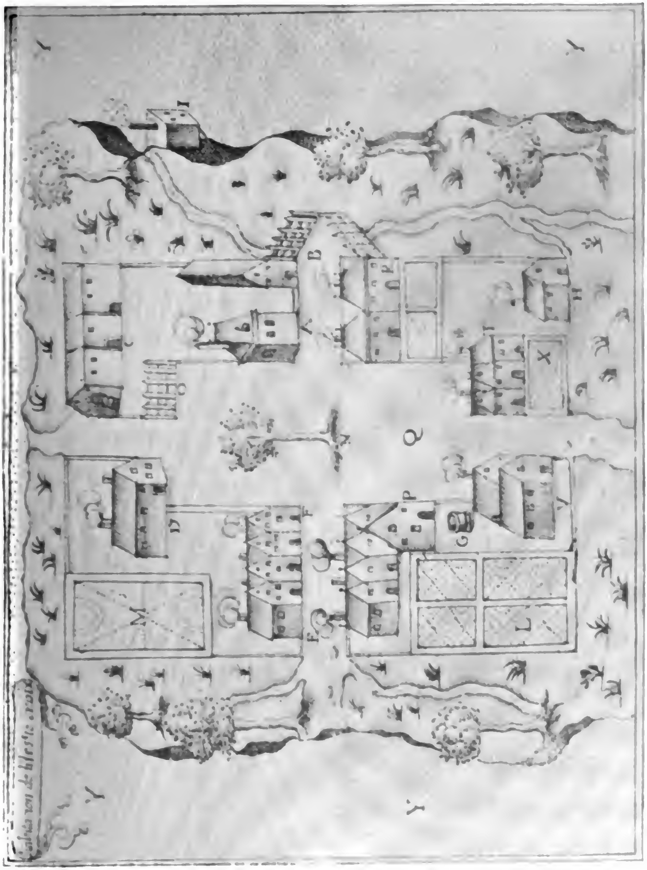


FIG. 9. View of the Settlement of de Monts on St. Croix Island, 1604-5. Drawn by Champlain. Original size.

see. The barricade being finished,[1] Sieur de Monts sent his barque[2] to notify the rest of our party, who were with our vessel in the Bay of St. Mary,[3] to come to St. Croix. This was promptly done, and while awaiting them we spent our time very pleasantly.

Some days after, our vessels[4] having arrived and anchored, all disembarked. Then without losing time, Sieur de Monts proceeded to employ the workmen in building houses for our abode, and allowed me to determine the arrangement of our settlement. After Sieur de Monts had determined the place for the store-house, which is nine fathoms[5] long, three wide, and twelve feet high, he adopted the plan for his own house, which he had promptly built by our good workmen, and then assigned to each one his location.[6] Straightway, the men began to gather together by fives and sixes, each according to his desire. Then all set to work to clear up the island, to go to the woods, to make the framework, to carry earth and other things necessary for the building.

While we were building our houses, Sieur de Monts despatched Captain Fouques in the vessel of Rossignol,[7] to find Pont Gravé at Canso, in order to obtain for our settlement what supplies remained.

Some time after he had set out, there arrived a small barque of eight tons, in which was du Glas of Honfleur, pilot of Pont Gravé's vessel, bringing the Basque shipmasters who had been captured by the above Pont while engaged in the fur-trade, as we have stated.[8] Sieur de Monts received them civilly, and sent them back by the above Du Glas to Pont Gravé, with orders for him to take the vessel he had captured to Rochelle, in arder that justice might be done. Meanwhile, work on the houses went on vigorously and without cessation; the carpenters engaged on the storehouse and dwelling of Sieur de Monts, and the others each on his own house, as I was on mine, which I built with the assistance of some servants belonging to Sieur d'Orville[9] and myself. It

---

[1] It thus appears that the little islet, now vanished, served as a temporary fort for the safety of the party after their barque was sent away.

[2] This barque is frequently mentioned in the narrative. What is doubtless a picture of it is given on Champlain's map (Fig. 8) to the northward of the island.

[3] Still so called, on the coast of Nova Scotia. It will be remembered that the vessel with the larger part of the men had been left at St. Mary's Bay, while de Monts and Champlain, with a few men, in a barque of eight tons, had explored the coasts and reached St. Croix Island.

[4] The vessel left at St. Mary's Bay (of which what is doubtless intended as a picture is given on Champlain's map, Fig. 8), and that of one Rossignol (see note 7 below).

[5] The fathom was nearly seven feet (see earlier, note 6 on page 155).

[6] A fuller description of de Monts' house, and other particulars about the settlement not mentioned by Champlain, are given by Lescarbot, as shown later, page 183. Compare also the accompanying plan of the settlement (Fig. 9).

[7] This vessel had been captured on the Nova Scotia coast while engaged in illicit trading, and had doubtless been brought to St. Croix Island with the vessel from St. Mary's Bay.

[8] De Monts possessed by his charter the sole right of trade with the natives in this region: hence the Basque captains were poachers.

[9] This is the Sieur D'Orville, whose name has been wrongly guessed to have been corrupted into the Devils of Devils Head (see earlier, page 146).

was forthwith completed, and Sieur de Monts lodged in it until his own was finished. An oven was also made, and a handmill for grinding our wheat, the working of which involved much trouble and labour to the most of us, since it was a toilsome operation. Some gardens were afterwards laid out on the mainland[1] as well as on the island, where many kinds of seeds were planted, which flourished very well on the mainland, but not on the island, since there was only sand here, and the whole were burned up when the sun shone, although special pains was taken to water them.

Some days after, Sieur de Monts determined to ascertain where the mine of pure copper was which he had searched for so much.[2] With this object in view he despatched me together with a savage named Messamoüet, who asserted that he knew the place well. I set out in a small barque of five or six tons, with nine sailors. Some eight leagues from the island towards the River St. John, we found a mine of copper which was not pure, yet good according to the report of the miner, who said it would yield eighteen per cent.[3] Farther on we found others inferior to this. When we reached the place where we supposed that was, which we were hunting for, the savage could not find it, so that it was necessary to come back, leaving the search for another time.

Upon my return from this trip, Sieur de Monts resolved to send his vessels back to France, and also Sieur de Poutrincourt, who had come only for his pleasure, and to explore countries and places suitable for a colony, which he desired to found; for which reason he asked Sieur de Monts for Port Royal,[4] which he gave him, in accordance with the power and direction he had received from the King. He sent back also Ralleau, his Secretary, to arrange some matters concerning the voyage. They set out from the Island of St. Croix the last day of August, 1604.

Chapter V. deals with a voyage of exploration made by Champlain, by order of de Monts, as far as Kennebec. Although of very great interest, it does not concern our present subject. He set out September 2, and returned to the island October 2.

[51] ***DU MAL DE TERRE, FORT CRUELLE MAL-adie. A quoy les hommes & femmes sauuages passent le temps durant l'yuer. Et tout ce qui se passa en l'habitation pendant l'hyuernement.***

CHAPITRE VI.

COMME nous arriuasmes à l'isle S. Croix chacun acheuoit de se loger. L'yuer nous surprit plustost que n'esperions, & nous empescha de faire beaucoup de choses que nous nous estions proposées. Neantmoins le sieur de Mons ne [52] laissa de faire faire des iardinages dans l'isle. Beaucoup commancerent à deffricher chacun le sien; & moy aussi le mien, qui estoit assez

---

[1] Shown on Champlain's map (Fig. 8). Their exact location is explained on page 156.

[2] A mine of copper had been reported from the Bay of Fundy the preceding year by one Sieur Prevert, as related in an earlier volume of Champlain's writings.

[3] This mine was probably in the vicinity of Beaver Harbour, where small veins of the copper ore chalcopyrite are known.

[4] Now Annapolis Basin, Nova Scotia. De Monts, as Lieutenant-General, had ample power to make grants of land to intending colonists.

grand, où ie semay quantité de graines, comme firent aussi ceux qui en auoient, qui vindrent assez bien. Mais comme l'isle n'estoit que Sable tout y brusloit presque lors que le soleil y donnoit: & n'aulons point d'eau pour les arrouser, sinon de celle de pluye, qui n'estoit pas souuent.

Le sieur de Mons fit aussi deffricher à la grande terre pour y faire des iardinages, & aux saults il fit labourer à trois lieues de nostre habitation, & y fit semer du bled qui y vint tresbeau & à maturité. Autour de nostre habitation il y a de basse mer quantité de coquillages, comme coques, moulles, ourcins, & bregaux, qui faisoyent grand bien à chacun.

Les neges commencerent le 6. du mois d'Octobre. Le 3. de Decembre nous vismes passer des glasses qui venoyent de quelque riuiere qui estoit gellée. Les froidures furent aspres & plus excessiues qu'en France, & beaucoup plus de durée: & n'y pleust presque point cest yuer. Ie croy que cela prouient des vents du nord & norouest, qui passent par dessus de hautes montaignes qui sont tousiours couuertes de neges, que nous eusmes de trois à quatre pieds de haut, iusques à la fin du mois d'Auril ; & aussi qu'elle [53] se conserue beaucoup plus qu'elle ne feroit si le païs estoit labouré.

Durant l'yuer il se mit vne certaine maladie entre plusieurs de nos gens, appelée mal de la terre, autrement Scurbut, à ce que l'ay ouy dire depuis à des hommes doctes. Il s'engendroit en la bouche de ceux qui l'auoient de gros morceaux de chair superflue & baueuse (qui causoit vne grande putrefaction) laquelle surmontoit tellement, qu'ils ne pouuoient presque prendre aucune chose, sinon que bien liquide. Les dents ne leur tenoient presque point, & les pouuoit on arracher auec les doits sans leur faire douleur. L'on leur coupoit souuent la superfluité de cette chair, qui leur faisoit letter force sang par la bouche. Apres il leur prenoit vne grande douleur de bras & de iambes, lesquelles leur demeuerent grosses & fort dures, toutes tachetes comme de morsures de puces, & ne peuuoient marcher à cause de la contraction des nerfs: de sorte qu'ils demeuroient presque sans force, & sentoient des douleurs intolerables. Ils auoient aussi douleur de reins, d'estomach & de ventre; vne thoux fort mauuaise, & courte haleine: bref ils estoient en tel estat, que la pluspart des malades ne pouuoient se leuer ny remuer, & mesme ne les pouuoit on tenir debout, qu'ils [54] ne tombassent en syncope: de façon que de 79. que nous estions, il en mourent 35. & plus de 20. qui en furent bien prés: La plus part de ceux qui resterent sains, se plaignoient de quelques petites douleurs & courte haleine. Nous ne pusmes trouuer aucun remede pour la curation de ces maladies. L'on en fit ouuerture de plusieurs pour recognoistre la cause de leur maladie.

L'on trouua à beaucoup les parties interieures gastées, comme le poulmon, qui estoit tellement alteré, qu'il ne s'y pouuoit recognoistre aucune humeur radicalle: la ratte cereuse & enflée: le foye fort legueux & tachetté, n'ayant sa couleur naturelle: la vaine caue, ascendante & descendante remplye de gros sang agulé & noir: le fiel gasté: Toutesfois il se trouua quantité d'arteres, tant dans le ventre moyen qu'inferieur, d'assez bonne disposition. L'on donna à quelques vns des coups de rasoüer dessus les cuisses à l'endroit des taches pourprées qu'ils auoient, d'où il sortoit vn sang caille fort noir. C'est ce que l'on a peu recognoistre aux corps infectés de cette maladie.

Nos chirurgiens ne peurent si bien faire pour eux mesmes qu'ils n'y soient demeurez comme les autres. Ceux qui y resterent malades furent gueris au printemps; lequel com-[55]mence en ces pays là est en May. Cela nous fit croire que le changement de saison leur rendit plustost la santé que les remedes qu'on leur auoit ordonnés.

Durant cet yuer nos boissons gelerent toutes, horsmis le vin d'Espagne. On donnoit le cidre à la liure. La cause de ceste parte fut qu'il ne auoit point de caues au magazin: & que l'air qui entroit par des fentes y estoit plus aspre que celuy de dehors. Nous estions contraints d'vser de tresmauualses eaux, & boire de la nege fondue, pour n'auoir ny fontaines ny ruisseaux: car il n'estoit pas possible d'aller en la grand terre, à cause des grandes glaces que le flus & reflus charioit, qui est de trois brasses de basse & haute mer. Le trauail du moulin à bras estoit fort penible: d'autant que la plus part estans mal couchez, auec l'incommodité du chauffage que nous ne pouuions auoir à cause des glaces, n'auoient quasi point de force, & aussi qu'on ne mangeoit que chair salée & legumes durant l'yuer, qui engendrent de mauuais sang: ce qui à mon opinion causoit en partie ces facheuses maladies. Tout cela donna du mescontentement au sieur de Mons & autres de l'habitation.

Il estoit mal-aisé de recognoistre ce pays sans y auoir yuerné, car y arriuant en eté tout y est [56] fort aggreable, à cause des bois, beaux pays & bonnes pescheries de poisson de plusieurs sortes que nous y trouuasmes. Il y a six mois d'yuer en ce pays. . . .

TRANSLATION.

CHAPTER VI.

Of the mal de terre, a very desperate malady. How the Indians, men and women, spend their time in winter. And of all that occurred at the settlement while we were passing the winter.

When we arrived at the Island of St. Croix,[1] each one had finished his place of abode. Winter came upon us sooner than we expected, and prevented us from doing many things which we had proposed. Nevertheless, Sieur de Monts did not fail to have some gardens made on the island. Many began to clear up the ground, each his own. I also did so with mine, which was very large,[2] where I planted a quantity of seeds, as also did the others who had any, and they came up very well. But since the island was all sandy, everything dried up almost as soon as the sun shone upon it, and we had no water for irrigation, except from the rain, which was infrequent.

Sieur de Monts caused also clearings to be made on the mainland for making gardens,[3] and at the falls three leagues from our settlement[4] he had work done and some wheat sown which came up very well and ripened. Around our habitation there is at low tide a large number of shell fish, such as cockles,[5] mussels, sea-urchins and sea-snails, which were a great boon to all.

The snows began on the sixth of October. On the third of December we saw ice pass which came from some frozen river.[6] The cold was sharp, more severe than in France, and of much longer duration; and it scarcely rained at all the entire winter. I suppose that is owing to the north and northwest wind passing over high mountains always covered with snow, which was from three to four feet deep up to the end of the month of April; lasting much longer, I suppose, than it would if the country were cultivated.

---

[1] After the journey described in the preceding chapter.

[2] This was no doubt the garden at L. on the plan (Fig. 9) adjoining Champlain's house.

[3] Shown on Champlain's map (Fig. 9).

[4] At the present site of Calais and St. Stephen.

[5] He means doubtless clams, which, with the others mentioned, are excessively abundant on this island. (See earlier, page 140).

[6] Champlain's account of the winter of 1604-5 shows that it was of unusual severity. (See earlier, page 138.) The ice came of course from the head of tide on the St. Croix near Calais and St. Stephen.

During the winter, many of our company were attacked by a certain malady called the mal de la terre; otherwise scurvy, as I have since heard from learned men. There were produced in the mouths of those who had it, great pieces of superfluous and drivelling flesh (causing extensive putrefaction), which got the upper hand to such an extent that scarcely anything but liquid could be taken. Their teeth became very loose, and could be pulled out with the fingers without its causing them pain. The superfluous flesh was often cut out, which caused them to eject much blood through the mouth. Afterwards a violent pain seized their arms and legs, which remained swollen and very hard, all spotted as if with flea bites; and they could not walk on account of the contraction of the muscles so that they were almost without strength and suffered intolerable pains. They experienced pain also in the loins, stomach and bowels, had a very bad cough and short breath. In a word, they were in such a condition that the majority of them could not rise nor move and could not even be raised up on their feet without falling down in a swoon. So that out of seventy-nine, who composed our party, thirty-five died, and more than twenty were on the point of death.[1] The majority of those who remained well also complained of slight pains and short breath. We were unable to find any remedy for these maladies. A post-mortem examination was made of several to investigate the cause of their malady.

In the case of many, the interior parts were found mortified, such as the lungs, which were so changed that no natural fluid could be perceived in them. The spleen was serous and swollen. The liver was legueux[2] and spotted, without its natural colour. The vena cava, superior and inferior, was filled with thick coagulated and black blood. The gall was tainted. Nevertheless, many arteries, in the middle as well as lower bowels, were found in very good condition. In the case of some, incisions with a razor were made on the thigh where they had purple spots, whence there issued a very black clotted blood. This is what was observed on the bodies of those infected with this malady.[3]

---

[1] These thirty-five were without doubt buried in the cemetery shown as occupying a little knoll on Champlain's map (Fig. 8). This knoll is now almost entirely washed away, though its position is readily recognizable (Fig. 14), and its only remnant is the slight rise where the birch trees stand at the north entrance to Treats Cove (Fig. 23). It was very probably the exposure of the skeletons of these victims of the scurvy by the washing away of the bank which gave origin to the former name of the island, Bone Island. The keeper of the lighthouse tells me that some years ago he dug up human bones on the site of the garden near the north end of the island (the incident mentioned in Mrs. Crowninshield's "All among the Lighthouses," compare earlier, page 152). He thought them remains of the French settlers, but suggests that they have been those of a negro said locally to have been buried on the island many years ago.

[2] There appears to be no such word in French, ancient or modern. I can only surmise that it is a misprint for ligneux, meaning woody, or wood-like.

[3] This disease was of course the scurvy, from which Arctic and other expeditions, obliged to depend upon salt food, suffered so much until recent advances in the regulation of diet have removed all danger from it.

Our surgeons could not help suffering themselves in the same manner as the rest. Those who continued sick were healed by Spring, which commences in this country in May. That led us to believe that the change of season restored their health, rather than the remedies prescribed.

During this winter all our liquors froze, except the Spanish wine. Cider was dispensed by the pound. The cause of this last was that there were no cellars under our storehouse, and that the air which entered by the cracks was sharper than that outside.[1] We were obliged to use very bad water, and drink melted snow, as there were no springs nor brooks; for it was not possible to go to the mainland in consequence of the great pieces of ice drifted by the tide,[2] which varies three fathoms between low and high water. Work on the hand mill was very fatiguing, since the most of us, having slept poorly, and suffering from insufficiency of fuel, which we could not obtain on account of the ice, had scarcely any strength, and also because we ate only salt meat and vegetables during the winter, which produced bad blood. The latter circumstance was, in my opinion, a partial cause of these dreadful maladies.[3] All this produced discontent in Sieur de Monts and others of the settlement.

It would be very difficult to ascertain the character of this region without spending a winter in it; for, on arriving here in summer, everything is very agreeable, in consequence of the woods, fine country, and many varieties of good fish which are found here. There are six months of winter in this country.

Here follows an account of the customs of the Indians of this region, of much interest and value but not connected with our present subject.

[57] . . . . Au mois de Mars ensuiuant il vint quelques sauuages qui nous firent part de leur chasse en leur donnant du pain & autres choses en eschange. . . . .

Nous attendions nos vaisseaux à la fin d'Auril lequel estant passé chacun commença à auoir mauuaise opinion, craignant qu'il ne leur fust arrivé

---

[1] Of course not a fact.

[2] Compare earlier, page 138.

[3] Aggravated by the enforced idleness of the men, no doubt.

Father Biard, in his Relation of 1616 (*Jesuit Relations*, III., 52), says:—

" Que de toutes les gens du sieur de Monts, qui premierement hyuernerent
" à Saincte Croix, onze seulement demeurent en santé. C'estoyent les chas-
" seurs, qui en gaillards compagnons aimoyent mieux la picorée, que l'air du
" foyer; courir vn estang, que de se renuerser pasesseusement dans vn lict, de
" pestrin les neiges en abbattant le gibier, que non pas de deuiser de Paris &
" ses rotisseurs aupres de feu."

TRANSLATION.

" Of all sieur de Monts's people who wintered first at Sainte Croix, only
" eleven remained well. These were a jolly company of hunters, who preferred
" rabbit hunting, to the air of the fireside; skating on the ponds, to turning
" over lazily in bed; making snowballs to bring down the game, to sitting
" around the fire talking about Paris and its good cooks."

These eleven doubtless included de Monts, Champlain, and the other gentlemen of the party, many of whom had come on the expedition in search of adventure.

quelque fortune, qui fut occasion que le 15. de May le sieur de Mons delibera de faire accomoder vne barque du port de 15. tonneaux, & vn autre de 7. afin de nous en aller à la fin du mois de Iuin à Gaspé, chercher des vaisseaux pour retourner en France, si cependant les nostres ne venoient: mais Dieu nous assista mieux que nous n'esperions: car le 15. de Iuin ensuiuant estans en garde enuiron sur les onze heures du soir, le Pont Capitaine de l'vn des vaisseaux du sieur de Mons arriua dans vne chaloupe, lequel nous dit que son nauire estoit ancré à six lieues de nostre ha-[58]bitation, & fut le bien venu au contentement d'vn chacun.

Le landemain le vaisseau arriua, & vint mouiller l'ancre proche de nostre habitation. Le pont nous fit entendre qu'il venoit aprés luy vn vaisseau de S. Maslo appelé le S. Estienne, pour nous apporter des viures & commoditez.

Le 17. du mois le sieur de Mons se delibera d'aller chercher vn lieu plus propre pour habiter & de meilleure temperature que la nostre: Pour cest effect il fit équiper la barque dedans laquelle il auoit pensé aller à Gaspé.

TRANSLATION.

. . . . In the month of March following, some savages came and gave us a portion of their game in exchange for bread and other things which we gave them.

We looked for our vessels at the end of April; but, as this passed without their arrival, all began to have an ill-boding, fearing that some accident had befallen them. For this reason, on the fifteenth of May, Sieur de Monts decided to have a barque of fifteen tons and another of seven fitted up, so that we might go at the end of the month of June to Gaspé, in quest of vessels in which to return to France, in case our own should not have arrived. But God helped us better than we hoped; for on the fifteenth of June ensuing, while on guard about eleven o'clock at night, Pont Gravé, Captain of one of the vessels of Sieur de Monts, arriving in a shallop, informed us that his ship was anchored six leagues from our settlement, and he was welcomed amid the great joy of all.

The next day the vessel arrived, and anchored near our habitation. Pont Gravé informed us that a vessel from St. Malo, called the St. Estienne, was following him, bringing us provisions and supplies.

On the seventeenth of the month, Sieur de Monts decided to go in quest of a place better adapted for an abode, and with better temperature than our own. With this view, he had the barque made ready in which he had proposed to go to Gaspé.

Chapters VII., VIII., IX. deal with a voyage made by de Monts, Champlain and others, as far as Cape Cod. They started June 18, and returned August 2.

[95] *L'HABITATION QUI ESTOIT EN L'ISLE DE S. Croix transportée au port Royal, & pourquoy.*

CHAPITRE X.

LE sieur de Mons se delibera de changer de lieu & faire vne autre habitation pour euiter aux froidures & mauuais yuer qu'auions eu en l'isle saincte Croix. N'ayant trouué aucun port qui nous fut propre pour lors, & le peu de temps que nous auions à nous loger & bastir des maisons à cest effect,

nous fit equipper deux barques, que l'on chargea de la charpenterie des maisons de saincte Croix, pour la porter au port Royal, à 25 lieues de là, où l'on iugeoit y estre la demeure beaucoup plus douce & temperée. Le Pont & moy partismes pour y aller; où estans arriuez cerchasmes vn lieu propre pour la situation de nostre logement [96] & à l'abry du norouest, que nous redoutions pour en auoir esté fort tourmentez.

TRANSLATION.

CHAPTER X.

The Dwelling-place on the Island of St. Croix transferred to Port Royal, and the reason why.

Sieur de Monts determined to change his location, and make another settlement, in order to avoid the severe cold and the bad winter which we had in the Island of St. Croix. As we had not, up to that time, found any suitable harbour, and, in view of the short time we had for building houses in which to establish ourselves, we fitted out two barques, and loaded them with the framework taken from the houses of St. Croix, in order to transport it to Port Royal, twenty-five leagues distant,where we thought the climate was much more temperate and agreeable. Pont Gravé and I set out for that place; and, having arrived, we looked for a site favourable for our residence, under shelter from the northwest wind, which we dreaded, having been very much harrassed by it.

Such is the history of de Monts' unhappy colony on St. Croix Island, as told in the matter-of-fact language of an eye-witness, the great Champlain. There exists also another much briefer account, possibly also by him, which supplies some additional details, that in Le Mercure François for 1608 (II. 294-295), which reads as follows:—

Le septiesme de Mars l'an 1604. le sieur de Monts partit auec deux nauires du Haure de Grace, pour y commencer ladite habitation. & y demeurer en Hyuer. Arrivé qu'il y fut apres auoir eu plusieurs tourmentes sur mer, il dressa sa premiere habitation en la riuiere de Canada, dans l'Isle de S. Croix, où il feit vn fort qu'il garnit de canon, & de plusieurs bastiments de charpenterie: Il y en aucuns qui se cabannerent à la mode des Sauuages: Bref ils desfricherent l'Isle, recogneurent quelques lieux és enuirons, où ils semerent des grains, & mirent le meilleur ordre qu'ils peurent pour y hyuerner: cependant que le sieur de Poitrincourt qui l'auoit accompagné en ce voyage, s'en retourna en France auec les deux nauires, qui emporterent plusieurs balles de Castors & autres marchandises de pelletrie.

L'Hyuer venir, qui est tres-rigoureux en ce pays-là, ces nouueaux habitans en reçeurent de grandes incommoditez, premierement de bois, & d'eau douce, n'ayans qu'vn seul bateau pour passer la grande riuiere & en aller querir, car leur barque n'estoit raccommodee: puis ce fut pitié pour les gelees & neiges, qui y furent si grandes, que le cidre gela dans les tonneaux, & le vin ne s'y distribuoit plus que par certains iours de la sepmaine: plusieurs qui beurent de l'eau de neige deuindrent incontinent malades de maladies incogneuës en l'Europe, pareilles à celles qu'eurent ceux qui y accompagnerent autresfois Iacques Quartier: Les iambes leur deuenoient premierement grosses & enflees, les nerfs retirez & noircis, puis la maladie leur montoit aux hanches, cuisses, espaules, aux bras & au col; la bouche leur deuenoit si infecte d'vne chair pourrie laquelle y surabondoit & renaissoit du iour au lendemain quand on la pensoit enleuer, qu'en peu de tenps trente-six en moururent: il y en eut quarante ou enuiron lesquels en guerirent quand le Printemps fut reuenu.

L'Hyuer passé, le sieur des Monts fit equipper la barque pour aller descouurir nouuelles terres où l'habitation peust estre plus saine qu'à S. Croix: il costoya plusieurs pays iusques à Malebarre, mais n'ayant trouué le lieu propre il s'en reuint à sa premiere habitation, attendant quelque nauire pours s'en retourner en France. Comme il estoit en ces termes, arriua le sieur du Pont-Graué de Honfleur auec vne compagnie de quelques quarante hommes pour le secourir: Ceste venuë fit qu'ils aduiserent ensemble d'aller faire la demeure à vn Port que le sieur de Poitrincourt auoit demandé audit sieur de Monts pour y habiter à leur retour; & l'auoit appellé le Port-Royal, qui est dans la Baye Françoise.

Ceste resolution prise, chacun desfaict son logis: on transporte tout à la nouuelle habitation.

TRANSLATION.

On the seventeenth of March in the year 1604, Sieur de Monts set out with two vessels from Havre de Grace to commence there the aforementioned settlement, and to winter there. Having arrived there after experiencing several storms at sea, he established his first settlement in the river of Canada[1] on the Isle St. Croix, where he built a fort which he provided with cannon, and with several framed buildings. Some constructed huts for themselves after the Indian manner. In short, they cleared the island, explored several places in its neighbourhood, where they sowed seeds, and placed everything in the best order they could for passing the winter. Meanwhile the Sieur de Poutrincourt who had accompanied him in this voyage, returned to France with the two ships which carried several bales of beaver and other kinds of fur.

The winter, which is very severe in that country, having set in, these new settlers suffered great hardships, especially for want of wood and fresh water, as they had but a single boat for passing the great river in search of these things, for their barque was not in repair. Then it was pitiful, for the ice and snow were so great there that the cider froze in the casks, and the wine was served only on certain days of the week. Many who drank of the snow water fell suddenly ill of diseases unknown in Europe, similar to those which they had who formerly accompanied Jacques Cartier. First their legs became thick and swollen, the muscles shrunken and black; then the disease crept up to the hips, thighs and shoulders, to the arms and neck; their mouths became so charged with rotten flesh which spread all over and grew afresh between night and morning when it was sought to remove it, that in a short time thirty-six of them died of it. There were about forty men who were cured of it when Spring returned.

The winter being over, Sieur de Monts fitted out the barque to go to seek new lands where a settlement would be more healthful than at St. Croix.

---

[1] This is an expression I do not understand, for the "River of Canada" was the St. Lawrence. Champlain could hardly have made such a mistake, which is evidence against his authorship of this account.

He coasted past several countries as far as Malebarre, but not finding a fitting place, he returned to his first settlement expecting some ship in which to return to France. Whilst he was in this position, the Sieur de Pont-Gravé of Honfleur, with a company of some forty men, arrived to aid him. On his arrival they considered together. This decided them to settle at a Port which the Sieur de Pontrincourt had asked of the said Sieur de Monts to settle on his return; he had called it Port Royal, and it is in the Baye Française [Bay of Fundy].

This determined upon, each one took down his house, and all were transported to the new settlement.

There is, happily, yet another contemporary account of these events, that by the historian Lescarbot, who, though not himself a witness of them, spent two winters at Port Royal, 1606-1608, with many of those, including Champlain, who had been at St. Croix Island with de Monts. Doubtless the events of that first winter were often discussed around the fires at Port Royal during the long winter evenings, and Lescarbot's ready note-book must have been often in use. Lescarbot's narrative shows more liveliness and imagination than Champlain's, and contains many facts not in the latter's works. The parts relating to our present subject, as given in the 1612 edition of his History, read thus:[1]—

CHAP. IIII.

. . . .

[460] . . . ilz vindrent . . . en vne grande riviere (qui est proprement mer) où ilz se camperent en vne petite ile size au milieu de cette riviere, que ledit sieur Champlein avoit esté reconoitre. Et la voyant forte de nature, [461] & de facile garde, joint que la saison commençoit à se passer, & partant falloit penser de se loger, sans plus courir, ilz resolurent de s'y arréter. Ie ne veux point rechercher curieusement les raisons des vns & des autres sur la resolution de cette demeure, mais je seray toujours d'avis que quiconque va en vn païs pour posseder la terre ne s'arréte point aux iles pour y estre prisonnier.

Car avant toutes choses il faut se proposer la culture d'icelle terre. Et je demanderois volontiers comme on la cultiuera s'il faut à toute heure, matin, midi & soir passer avec grand'peine vn large trajet d'eau pour aller aux choses qu'on requiert de la terre ferme? Et si on craint l'ennemi, comment se sauvera celui qui sera au labourage ou ailleurs en affaires necessaires, estant poursuivi? car on ne trouve point toujours de bateau à point nommé, ni deux hommes pour le conduire. D'ailleurs notre vie ayant besoin de plusieurs commodités, vne ile n'est pas propre pour commencer l'établissement d'vne colonie s'il n'y a des courans d'eau douce pour le boire, & le menage, ce qui n'est point en des petites iles. Il faut du bois pour le chauffage: ce qui n'y est point semblablement. Mais sur tout il faut avoir les abris des mauvais vents, & des froidures: ce qui est difficile de trouver en vn petit espace environné d'eau de toutes parts. Neantmoins la compagnie s'arréta là au milieu d'vne

---

[1] The following passages from Lescarbot agree in all essentials with the 1612 edition, as kindly corrected for me by Mr. Paltsits; but they differ in some details of typography which could not be exactly rendered by the modern type.

riviere large où le vent de Nort & de Norouëst bat à plaisir. Er d'autant qu'à deux lieuës au dessus il y a des ruisseaux qui viennent comme en croix se déchar[462]ger dans ce large bras de mer, cette ile de la retraite des François fut appelée SAINCTE CROIX, à vingt-cinq lieuës plus loin que le Port-Royal. Or ce-pendant qu'on commencera à couper & abbatre les Cedres & autres arbres de ladite ile pour faire les batiments necessaires, retournons chercher Maistre Nicolas Aubri, perdu dans les bois, lequel on tient pour mort il y a long temps.

Comme on estoit apres à deserter l'ile, le sieur Champ-doré fut r'envoyé à la Baye Saincte Marie avec vn maitre de mines qu'on y avoit mené pour tirer de la mine d'argent & de fer: ce qu'ilz firent. . . . . [463] . . . . Le pauvre Aubri . . . . estoit merveilleusement extenué, comme on peut penser. On lui bailla à manger par mesure, & le remena-on vers le troupe à l'ile Saincte Croix, dont chacun receut vne incroyable joye & consolation, & particulierement le sieur de Monts, à qui cela touchoit plus qu'à tout autre.

. . . .
. . . .

[466] Or apres qu'on l'eut fétoyé & sejourné encore par quelque temps à ordonner les affaires, & reconoitre la terre des environs l'ile Saincte Croix, on parla de r'envoyer les navires en France avant l'hiver, & à tant se disposerent au retour ceux qui n'estoient allez là pour hiverner. Ce-pendant les Sauvages de tous les environs venoient pour voir le train des François, & se rengeoient volontiers aupres d'eux: mémes en certains differens faisoient le sieur de Monts juge de leurs debats, qui est vn commencement de sujection volontaire, d'où on peut concevoir vne esperance que ces peuples se rangeront bien tôt à nôtre façon de vivre.

[467] Entre autres choses survenuës avant le partement desdits navires, avint vn jour qu'vn Sauvage nommé *Bituani* trouvant bonne la cuisine dudit sieur de Monts, s'y estoit arrété, & y rendoit quelque service: & neantmoins faisoit l'amour à vne fille pour l'avoir en mariage, laquelle ne pouvant avoir de gré & du consentement du pere, il la ravit, & la print pour femme. Là dessus grosse querelle. Et en fin la fille lui est enlevée, & retourne avec son pere. Vn grand debat se preparoit, n'eust esté qui *Bituani* s'estant plaint de cette injure audit sieur de Monts, les autres vindrent defendre leur cause, disans, à sçavoir le pere assisté de ses amis, qu'il ne vouloit point bailler sa fille à vn homme qui n'eust quelque industrie pour nourrir elle & les enfants qui proviendroient du mariage: Que quant à lui il ne voyoit point qu'il sceut rien faire: Qu'il s'amusoit à la cuisine de lui sieur de Monts, & ne s'exerçoit point à chasser. Somme qu'il n'auroit point la fille, & devoit se contenter de ce qui s'estoit passé. Ledit sieur de Monts les ayant ouys il leur remontra qu'il ne le detenoit point, & qu'il estoit gentil garçon, & qu'il iroit à la chasse pour donner preuve de ce qu'il sçavoit faire. Mais pour tout cela, si ne voulurent-ilz point lui rendre la fille qu'il n'eust montré par effet ce que ledit sieur de Monts promettoit. Bref il va à la chasse (du poisson) prent force saumons: La fille lui est renduë, & le lendemain il vint revétu d'vn beau manteau de castors tout neuf bien orné de *Matachiaz*, au Fort qu'on [468] commençoit à batir pour les François, amenant sa femme quant & lui, comme triomphant & victorieux, l'ayant gaignée de bonne guerre: laquelle il a toujours depuis fort aimée par dessus la coutume des autres Sauvages: donnant à entendre que ce qu'on acquiert avec peine on le doit bien cherir.

[468, i.e., 469] *Description de l'Ile Saincte Croix: Enterprise du sieur de Monts difficile, & genereuse : et persecutée d'envies. Retour du sieur de Poutrincourt en France :* . . . .

CHAP. V.

DEVANT que parler du retour des navires en France, il nous faut dire que l'ile de saincte Croix est difficile à trouver à qui n'y a esté. Car il y a tant d'iles & de grandes bayes à passer devant qu'on y soit, que je m'etonne comme on avoit penetré si avant pour l'aller trouver. Il y a trois ou quatre montagnes eminentes par dessus les autres aux côtez : mais de la part du Nort d'où descend la riviere, il n'y en a sinon vne pointué eloignée de plus de deux lieuës. Les bois de la terre ferme sont beaux & relevez par admiration & les herbages semblablement. Il y a des ruisseaux d'eau douce tres-agreables vis à-vis de l'ile, où plusieurs des gens du sieur de Monts faisoient leur menage, & y avoient cabanné. Quant à la nature de la terre, elle est tresbonne et heureusement abondante. Car ledit sieur de Monts y ayant fait cultiver quelque quartier de terre, & icelui ensemencé de segle (je n'y ay point veu du froment), il n'eut moyen d'attendre la maturité d'icelui, pour le recueillir: & neantmoins le grain tombé a sur[470]creu & rejetté si merveilleusement, que deux ans apres nous en recueillimes d'aussi beau, gros, & pesant qu'il y en ait point en France, que la terre avoit produit sans culture: & de present il continuë à repulluler tous les ans. Ladite ile ha environ demi lieuë de tour, & au bout du coté de la mer il y a vn tertre, & comme vne ilot separé où estoit placé le canon dudit sieur de Monts, & là aussi est la petite chappelle batie à la Sauvage. Au pied d'icelle il y a des moules tant que c'est merveilles, lesquelles on peut amasser de basse mer, mais elles sont petites. Je croy que les gens dudit sieur de Monts ne s'oublierent point à prendre les plus grosses, & n'y laisserent que la semence & menuë generation. Or quant à ce qui est de l'exercise & occupation de noz François, durant le temps qu'ils ont esté là, nous le toucherons sommairement apres que nous aurons reconduit les navires en France.

. . . . Les navires du sieur de Monts retournans en France, [471] le voilà demeuré en vn triste lieu avec vn bateau & vne barque tant seulement. [472] . . . . Le sieur de Poutrincourt avoit fait le voyage par dela avec quelques hommes de mise, non pour y hiverner, mais comme pour y aller marquer son logis, & reconoitre vne terre qui lui fust agreable. Ce qu'ayant fait, il n'avoit besoin d'y sejourner plus long temps. Par ainsi les navires estans prets à partir pour le retour, il se mit & ceux de sa compagnie dedans l'vn d'iceux. . . . .
[474] . . . . ayant le dit sieur de Poutrincourt laissé ses armes & munitions de guerre en l'ile saincte Croix en la garde dudit sieur de Monts, comme vn arre & gage de la bonne volonté qu'il avoit d'y retourner. . . . .

[475] *Batimens de l'ile Saincte Croix : Incommoditez des François audit lieu : Maladies inconeuës.* . . . .

CHAP VI.

PENDANT la navigation susdite le sieur de Monts faisoit travailler à son Fort lequel il avoit assis au bout de l'ile à l'opposite du lieu où nous avons dit qu'il avoit logé son canon. Ce qui estoit prudemment consideré, à fin de tenir toute la riviere sujete en haut & en bas. Mais il y avoit vn mal que ledit Fort estoit du côté du Nort, & sans [476] aucun abri, fors que des arbres qui estoient sur la rive de l'ile, lesquels tout a l'environ il avoit defendu d'abattre. Et hors icelui Fort il y avoit le logis des Suisses grand & ample, & autres petits representans comme vn faux-bourg. Quelques-vns s'estoient cabannés en la terre ferme pres le ruisseau. Mais dans le Fort estoient le logis dudit sieur de Monts fait d'vne belle & artificielle charpenterie, avec la banniere de France au dessus. D'vne autre part estoit le magazin, où reposoit le salut & la vie d'vn chacun, fait semblablement de belle charpenterie, & couvert de bardeaux. Et vis à vis du magazin estoient les logis & maisons des sieurs d'Orville, Chanplein, Champ-doré, & autres notables personages. A l'opposite dulogis dudit sieur de Monts estoit vne gallerie couverte pour l'exercice soit du jeu ou des ouvriers en temps de pluie. Et entre ledit Fort & la Plateforme où estoit le canon, tout estoit rempli de jardinages, à quoy chacun s'exerçoit de gaieté de cœur. Tout l'automne se passa à ceci: & ne fut pas mal allé de s'estre logé & avoir defriché l'ile avant l'hiver, tandis que pardeça on faisoit courir les levrets souz le nom de maitre Guillaume, farcis de toutes sortes de nouvelles : par lesquels entre autres choses ce pronostiqueur disoit que le sieur de Monts arrachoit des épines en *Canada*. Et quand tout est bien consideré, c'est bien vrayment arracher des épines que de faire de telles entreprises remplies de fatigues & perils continuels, de soins, d'angoisse, & d'incommoditez. Mais la vertu & le cou[477]rage qui dompte toutes ces choses fait que ces épines ne sont qu'œillets & roses à ceux qui se resolvent à ces actions héroïques pour se rendre recommandables à la memoire des hommes, & ferment les yeux aux plaisirs des douillets qui ne sont bons qu'à garder la chambre.

Les choses plus necessaires estant faites, & le pere grisart, c'est à dire l'hiver, estant venu, force fut de garder la maison, & vivre vn chacun chez soy. Durant lequel temps nos gens eurent trois incommoditez principales en cette ile, à-sçavoir faute de bois (car ce qui estoit en ladite ile avoit servi aux batimens) faut d'eau douce, & le guet qu'on faisoit de nuit craignant quelque surprise des Sauvages qui estoient cabanés au pied de ladite ile, ou autre ennemi. Car la malediction & rage de beaucoup de Crétiens est telle, qu'il se faut plus donner garde d'eux, que des peuples infideles. Chose que ie dis à regret: mais à la mienne volonté que ie fusse menteur en ce regard, & que le sujet de le dire fust ôté. Or quand il falloit avoir de l'eau ou du bois on estoit contraint de passer la riviere qui est plus de trois fois aussi large que la Seine de chacun côté. C'estoit chose penible & de longue haleine. De sort qu'il falloit retenir le bateau bien souvent vn jour devant que le pouvoir obtenir. Là-dessus les froidures & neges arrivent & la gelée si forte que le cidre estoit glacé dans les tonneaux, & falloit à chacun bailler sa mesure au poids. Quant au vin il n'estoit distribué que par certains jours de la semaine. Plusieurs paresseux buvoient de l'eau de nege, sans pren[478]dre le peine de passer la riviere. Bref voici des maladies inconeuës semblables à celles que le Capitaine Iacques Quartier nous a reprenentées ci-dessus, lesquelles pour cette cause ie ne decriray pas, pour ne faire vne repetition vaine. De remede il ne s'en trouvoit point. Tandis les pauvres malades languissoient, se comsommans peu à peu, n'ayans aucune douceur comme de laictage ou bouillie, pour sustenter cet estomach qui ne pouvoit recevoir les viandes solides, à-cause de l'empechement d'vne chair pourrie qui croissoit & surabondoit dans la bouche, & quand on le pensoit enlever elle renaissoit du jour au lendemain plus abondamment que devant. Quant à l'Arbre *Annedda* duquel ledit Quartier fait mention, les Sauvages de ces terres ne le conoissent point.

Si bien que c'estoit grande pitié de voir tout le monde en langueur, excepté bien peu, les pauvres malades mourir tous vifs sans pouvoir estre secourus. De cette maladie il y en mourut trente-six, & autres trente-six, ou quarante, qui en estoient touchez guerirent à l'aide du printemps si-tot qu'il fust venu. Mais la saison de mortalité en icelle maladie sont la fin de Ianvier, le mois de Fevrier & Mars, ausquels meurent ordinairement les malades chacun à son rang selon qu'ils ont commencé de bonne heure à estre indisposez : de maniere que celui qui commencera sa maladie en Fevrier & Mars pourra échapper: mais qui se hatera trop, & voudra se mettre au lict en Decembre & Ianvier il sera en danger de mourir en Fevrier, Mars, ou au commencement [479] d'Avril, lequel temps passé il est en esperance & comme en asseurance de salut.

. . . .

[496]

LA saison dure estant passée, le sieur de Monts, ennuié de cette triste demeure de Saincte Croix, delibera de chercher vn autre port en païs plus chaud & plus au Su : . . . .

. . . .

[499] . . . . Et à-tant ledit sieur de Monts fit appareiller pour retourner à saincte Croix, où il avoit laissé vn bon nombre de ses gens encore infirmes de la secousse des maladies hivernales, de la santé desquels il estoit soucieux. . . . .

[501] *Arrivée du sieur du Pont à l'ile saincte Croix: Habitation transferée au Port Royal:* . . . .

CHAP. VIII.

LA saison du printemps passée au voyage des Armouchiquois, le sieur de Monts attendit à Saincte Croix le temps qu'il avoit convenu: dans lequel s'il n'avoit nouvelles de France il pourroit partir & venir chercher quelque vaisseau de ceux qui viennent à la Terreneuve pour la pécherie du poisson, à fin de repasser en France dans icelui avec sa trouppe, s'il estoit possible. Ces temps dés-ja estoit expiré, & estoient prets à faire voile, n'attendans plus aucun secours ni rafraichissemens, quand voici arriver le sieur du Pont, surnommé Gravé, demeurant à Honfleur, avec vne compagnie de quelques quarante hommes, pour relever de sentinelle ledit sieur de Monts & sa troupe. Ce fut au grand contentement d'vn chacun, comme l'on peut penser: & canonnades ne manquerent à l'abord, selon la coutume, ni l'éclat des trompetes. Ledit sieur du [502] Pont ne sçachant encore l'état de noz François, pensoit trouver là vne demeure bien asseurée, & ses logemens prets: mais attendu les accidens de la maladie étrange dont nous avons parlé, il fut avisé de changer le lieu. Le sieur de Monts eust bien desiré que l'habitation nouvelle eust esté comme par les quarante degrez sçavoir à six degrez plus au Midi que le lieu de Saincte Croix: mais apres avoir veu la côte jusques à Malebarre, & avec beaucoup de peines, sans trouver ce qu'il desiroit, on delibera d'aller au Port Royal faire la demeure, attendant qu'il y eust moyen de faire plus ample decouverte. Ainsi voila chacun embesoigné a trousser son pacquet: on demolit ce qu'on avoit bati avec mille travaux, hors-mis le magazin, qui estoit vne piece trop grande à transporter, & en execution de ceci plusieurs voyages se font. Tout estant arrivé au Port-Royal. . . . .

TRANSLATION.

Description of . . . . Isle Saincte Croix. . . . . Disputes among the Indians referred to the decision of Sieur de Monts. . . . .

CHAPTER IIII.

. . . . they came . . . . into a large river, (which is properly a part of the sea), where they encamped on a little island in the middle of the river which the said Sieur de Champlain had been to reconnoitre.[1] And seeing it naturally strong and easy of defense, besides the season was slipping away so that it was time to think of lodging themselves, without going farther they resolved to stop there. I do not wish to inquire too closely into the various reasons for the decision as to this dwelling, but I shall always be of the opinion that whosever goes to a country to take possession of it should not make themselves prisoners upon islands.[2]

For, before everything else, the cultivation of the land must be regarded. And I would fain ask how one will cultivate it if he must at all hours, morning, noon and night, cross with much trouble a large passage of water to go for the things one requires from the mainland. And if one fears the enemy, how will he be saved if working in the fields or at other necessary work he is pursued? For one does not always find a boat in time of need nor two men ready to manage it. Further, our life having need of many comforts, an island is not good for commencing a colony if there is not running fresh water for drinking and household needs, something which is not found in little islands. Wood is needed for fuel, which likewise is not there. But above everything there is needed protection from the violent winds and the cold, which it is hard to find on a little island totally surrounded by water.[3] Nevertheless the company stopped there in the middle of a big river where the north and northwest winds sweep at their will. And since two leagues above there are rivers which form a cross at their discharge into this large arm of the sea, this island of the refuge of the French was called Saincte Croix;[1] it is twenty-five leagues beyond Port Royal.

---

[1] This seems to imply that Champlain discovered the island when unaccompanied by de Monts. This is more explicitly stated by Charlevoix in his History of New France (Shea's Translation, I., 252), where he tells of Champlain exploring the coast in a sloop and pushing on to the Island, where, "M. de Monts arriving soon after," etc. Charlevoix in 1744, as his references show, had no source of information on this subject not open to us now, so that his statement doubtless rests upon this passage in Lescarbot. The entire narrative of Champlain shows, however, that he and de Monts were together on this voyage, and if Lescarbot really means that Champlain discovered the island, it must be that he found it while exploring in the small boat while de Monts in the barque was exploring some other part of the immediate neighbourhood, perhaps the Magaguadavic or other part of Passamaquoddy Bay. In this connection the Indian legends given on a later page (page 189) may be noted; it is possible that de Monts was erecting a cross at the mouth of the Magaguadavic, while Champlain, to save time, explored beyond in the smaller boat, and found this river and island.

[2] This idea is also expressed by Sir William Alexander in his "Encouragement to Colonies," 1624, when he says, referring to this settlement,—"in the end finding that a little Ile was but a kind of large prison."

[3] These arguments against settling on islands are sound, but how much easier it is to be wise after than before the event! It is reasonably certain that had Lescarbot been with de Monts in 1604, he too would have been convinced from the data at his command (on which compare earlier, page 141)

. . . .

Now whilst they began to cut and fell the cedars and other trees of the said island in order to construct the necessary buildings, let us return to seek Master Nicolas Aubri, who had been lost in the woods, and long since believed to be dead.[2]

When the island was being cleared, the sieur Champdoré was sent to St. Marys Bay with a mining expert who had been brought with them to take samples from the mine of silver and iron, which they did.[3] . . . . The poor Aubri was wonderfully wasted, as one would suppose. They gave him food by degrees, and took him to the company at Isle St. Croix, whence everyone was completely overjoyed and relieved, and particularly the Sieur de Monts, who was touched by this as by nothing else. . .

Now after having feasted him[4] and remained some time to arrange matters and to explore the country around Isle Saincte Croix, they spoke of sending the ships back to France before the winter and at the same time arranged for the return of those who had not come there to winter.[5] In the meantime the Indians from all the neighbourhood came to see the outfit of the French, and placed themselves voluntarily near them;[6] even in certain disputes making the sieur de Monts judge of their discussions, which is a commencement of a voluntary submission from which one may take hope that these people will adopt entirely our mode of life.

Amongst other things which happened before the departure of the vessels, it came about one day that an Indian named *Bituani*, who had found the kitchen of Sieur de Monts attractive, and had established himself there, rendering some service, in the meantime made love to a girl with a view of having her in marriage; but not being able to bring this about with the

---

that the island was a suitable site for a settlement. It must be remembered that it was only after experiencing the winter of 1604-1605 that its disadvantages as a site of a settlement were, or could be, known.

[1] Had we not this statement of Lescarbot the origin of the name Sainte Croix applied to this island would have remained uncertain, but with it there is no doubt. (Compare earlier, page 144.)

[2] The priest (as Champlain says he was), who was lost at St. Mary's Bay some two weeks earlier, as related both by Champlain and Lescarbot. He was found by Champdoré on his arrival at St. Mary's Bay.

[3] Evidently this was the same expedition mentioned by Champlain, when he says that de Monts sent the barque to notify the remainder of the party who were in St. Mary's Bay, etc. (Compare earlier, page 165.)

[4] Viz., Nicholas Aubri.

[5] Sieur de Poutrincourt and others.

[6] They encamped apparently at the foot of the island, (later, page 182), and for them doubtless the chapel, built after the Indian fashion, (Fig. 8, 14), was intended (compare later note 4, page 182). Indian relics have been found on the island, notably a number of wampum beads, now in possession of Rev. Jos. Lee, of Red Beach, Maine.

liking and consent of her father, he ravished her and took her to wife. Then ensued a great quarrel. Finally the girl is taken away from him and returned to her father. A great debate impended, had it not been that the said *Bituani* having complained of this injury to the Sieur de Monts, the others came to defend their cause, saying, that is the father assisted by his friends, that he would not entrust his daughter to a man who had not the industry to support her and the children which would result from the marriage. That as to him [Bituani] he saw nothing that he could do, that he loitered about the kitchen of the Sieur de Monts, and did not exert himself in hunting, and finally that he should not have the girl, and ought to be satitsfied with that which was past. The Sieur de Monts having heard both parties, remarked that he did not detain him [Bituani], that he was a good youth and should go a hunting to show what he could do. But for all that they would not restore the maid to him until he had shown in fact that which the Sieur de Monts had promised for him. Finally he went a fishing, and took a great haul of salmon. The girl is returned to him, and the next day following he came, clothed in a beautiful new robe of beaver skins, very well ornamented with wampum, to the fort which was then a building for the Frenchmen, bringing his wife with him as triumphing in his victory, having gained her in fair fight. He has ever since loved her well, contrary to the Indian custom, giving us to understand that what is acquired with trouble ought to be much cherished.[1]

CHAPTER V.

Description of Isle Saincte Croix. Enterprise of the Sieur de Monts, difficult and public-spirited, but persecuted by envy: Return of the Sieur de Poutrincourt to France.

Before speaking of the return of the ships to France, it should be said that the Isle St. Croix is hard to find for one who has not been there, for there are so many islands and bays to pass before one gets there that I am astonished how they penetrated so far to find it. There are three or four mountains prominent above the others on the banks, but on the north from which the river descends there is nothing but a sharp pointed one over two leagues distant.[2] The woods of the mainland are fair and admirable, and the grass is the same. There are two very pleasing streams of fresh water opposite the island, where several of the men of Sieur de Monts did their housekeeping, and had built huts there.[3] As to the nature of the land, it is very good, and gratifyingly productive. For the sieur de Monts having had a certain piece of land there[1] cultivated and sown with rye (I have not seen any wheat there), he was not able to await its ripening before gathering it, but nevertheless the grain grew to excess, and reproduced so wonderfully that two years[2] afterwards we gathered it as fine, large and heavy as it ever is in France which the land had produced without cultivation, and at present it continues to multiply every year. The said island is about a half league in circuit, and at the end of it, on the sea side, there is a hillock, as it were a separated islet,[3] where the Sieur de Monts placed his cannon, and there also is the little chapel built after the Indian fashion.[4] At its foot are shellfish so many that it is wonderful, which are gathered at low water, but they are small. I believe that the men of the Sieur de Monts were careful to take the larger, leaving there the spawn and the smaller generation.[5] Now as to the activities and occupation of our Frenchmen whilst they were on the Island, we shall give a summary after we have followed the ships back to France.

---

[1] These mountains are evidently the loftier ones along the Canadian shore (Fig. 2), Chamcook and Greenlaw, with McLaughlans, Simpsons and Leightons. The sharp pointed one two leagues distant is plainly on Cooksons Island in Oak Bay, and his special reason for mentioning it in this way is no doubt to show how unprotected was the island from the north winds.

[3] One would think he referred here to the two streams at Red Beach, Beaver Lake Brook and Lows Brook (Fig. 2), were it not that Champlain's map (Fig. 8) marks a camp or cabin beside the gardens at Johnsons Cove on the Canadian shore, implying that this was one of the two, and Beaver Lake Brook the other. The former stream is, however, at present extremely small, little more than a swale, running only in times of much rain. In the wooded condition of the country it may then have been more constant. Lescarbot (see later, page 83), implies that some of the men took up their abode on the mainland.

. . . . The ships of Sieur de Monts returning to France left him there in a desolate place with one boat and a barque only.[6] . . . .

---

[1] Apparently he is here referring to the land cultivated at the Falls of River des Etchemins, *i.e.*, on the present site of Calais or St. Stephen, as mentioned by Champlain (earlier, page 168), though he may refer to the land cultivated near the camping place just mentioned, in which case it would be the place at Johnsons Cove mentioned in Note 2 above.

[2] His visit to the Island two years later is described later in this paper, page 192.

[3] Wrongly shown as connected with the main island on Champlain's map (Fig. 8); compare earlier, note 1, page 161.

[4] Lescarbot seems to imply that the chapel was on the islet with the cannon, but Champlain's map (Fig. 8) shows that this was not the case, and probably Lescarbot means to say merely that it was at the same end of the island as the islet. Another possible but less likely explanation is that the chapel shown by Champlain on his map, was a more pretentious structure, used by the French, and that there was another, merely a wigwam for the Indians on the same islet with the cannon. It is furthermore possible that the building shown on the plan of the settlement (Fig. 9) as attached to the house of the priest was a chapel. In any case, there is surprisingly little reference to the chapel, or to any religious matters, in the narratives, a fact easily explained on reflection, since de Monts was a Protestant as were others of his company, and they were accompanied both by a priest and a Protestant minister. The silence of both Champlain and Lescarbot as to religious matters is due no doubt to the fact that Protestant influence was prominent in the settlement, and they were writing in and for a country overwhelmingly Roman Catholic. Compare also the incident later, on page 191.

[5] On the shell fish, see earlier, page 140. This selection of the largest, leaving the smallest to breed, here mentioned, represents the first attempts at mollusc culture in the New World, as pointed out in the Bulletin of the Natural History Society of New Brunswick, No. VIII., page 16.

[6] Presumably the barque was hauled from the water for the winter, leaving them but the one small boat in which to bring wood and water from the mainland. This is implied in a statement in Le Mercure François (see earlier page 173).

. . . . The Sieur de Poutrincourt had made the voyage there with some of his own men, not to winter there, but in order to select a residence and to explore out a pleasing place. This having been done. he had no need to remain longer. Hence the vessels being ready to return, he embarked on one of them with his retinue.

. . . . the Sieur de Poutrincourt having left his arms and munitions of war on St. Croix Island in care of the sieur de Monts, as a pledge and guarantee of his good intention to return there. . . . .

CHAPTER VI.

Buildings on St. Croix Island. Discomforts of the French at this place. Unknown sickness.

During the voyage just described,[1] the Sieur de Monts had work done on his fort,[2] which he had placed at the end of the island at the end opposite to the place where we have mentioned he placed his cannon. This had been prudently considered in order to command all the river above and below. But it was a fault that the fort was on the north side and without any shelter except for the trees which were on the bank of the island all around which he had forbidden to be cut down. And outside of the fort was the lodging of the Swiss,[3] large and spacious, and other small buildings like a fauxbourg [or suburb].[4] Some had housed themselves on the main land near the brook. But inside the fort was the residence of the said Sieur de Monts, built with beautiful and artistic woodwork,[5] with the banner of France above. In another place was the storehouse, in which was the health and life of everybody, built also of good woodwork, and covered with shingles. Opposite the storehouse were the dwellings of the Sieurs d'Orville, Champlain, Champdoré[6] and other notable persons. Opposite the residence of the Sieur de Monts was a covered gallery for exercise play or work in time of rain. And between the said fort and the platform where were the cannon, all the space was occupied by gardens in which each one exercised himself with a happy heart. Thus the autumn passed; and it was well for them to have lodged themselves, and to have cleared the island before the winter; whilst in these parts pamphlets[1] were circulated under the name of Maitre Guillaume (Master William), stuffed with all kinds of news,[2] by the which, amongst other things, this prophet said that Sieur de Monts did pull out thorns in Canada.[3] And when all is said it is very truly pulling out thorns in taking in hand such enterprises full of continual perils and fatigues, of cares, anguish and discomforts. But the virtue and the courage which subdues everything makes these thorns but carnations and roses to those who are determined on heroic actions to commend themselves to the memory of men, and close their eyes to the pleasures of those effeminates who are good only to guard the chamber.

---

[1] That made by Champlain to the Kennebec (page 166).

[2] Champlain does not in his narrative speak of this place as a fort, but his plan and the description here given by Lescarbot show that a part of the settlement was included within a palisade, to which, no doubt, it was intended the settlers could retreat from an enemy as to a citadel, abandoning the remainder of the buildings. As the Indians were the only foe to be considered, however, a palisade between the buildings was sufficient. This fort included apparently the dwelling of Sieur de Monts, the storehouse and the general assembly house, between which buildings was a palisade (see the plan, Fig. 9, and also 14).

[3] Apparently Swiss workmen, possibly also soldiers.

[4] A suburb, *i.e.*, like the more open places with separated residences and gardens on the outskirts of a city.

[5] Of course brought from France, as was probably in part at least the storehouse. The other buildings were probably simply log huts, while those of the men appear to have been little better than Indian wigwams. Champlain's picture-plan of the settlement (Fig. 9) is obviously a good deal idealized.

[6] Not quite correct ; compare Champlain's plan (Fig. 9).

The most needful things having been done, the hoary father, that is to say, the winter, being come, made it necessary to keep to the house and each to live at his own home. During this time our people suffered three principal discomforts on the island, namely, lack of wood (for that which was on the island had been used for the buildings), want of fresh water, and the watching which was done at night through fear of some surprise by the Indians who were encamped at the foot of the island, or some other enemy. For the malediction and rage of many Christians is such that it is necessary to guard against them more than against infidels. This is something I say with regret, but I would that I lied in this regard and that I had no cause to speak it.[4] Now, when it was necessary to have fresh water or wood one had to pass the river which is more than thrice as large as the Seine on each side. It is a painful and tedious business. So that it was needful to keep the boat very often a whole day before obtaining the things needed.[5] Then the cold and snow arrived, and the freezing was so strong that the cider was frozen in the barrels, and it was necessary to portion out the share of each one by weight. As for the wine, it was only served out on certain days of the week. Many lazy fellows drank snow water without taking the trouble to cross the river.[6] In brief here came a certain unknown sickness like to those which Captain Jacques Cartier has described to us earlier, which for this reason I shall not describe again, to avoid a vain repetition. No remedy was found. Meanwhile the poor sick creatures languished, pining away little by little, having no dainties such as milk or soups to sustain a stomach which could not take solid food because of the growth of a hindrance of a rotten flesh which grew and over-abounded in the mouth, and when one thought to remove it, it grew in one night more abundantly than before. As to the tree Anneda [1] of which the said Cartier makes mention, the Indians in this region do not know it. It was indeed a great pity to see everybody in decline except a very few,[2] and to see the poor invalids dying as it were full of life without any possibility of help. Of this malady there died thirty-six, and another thirty-six or forty who were affected improved by the help of the spring as soon as it came. But the season of mortality in this disease began the last of January, the months of February and March, when ordinarily they died in the order each in his turn according to whether they commenced early to be taken; so that he who began to be ill in February and March could escape; but he who hastened too much and would take to his bed in December and January, he was in danger of dying in February, March, or the beginning of April, which time being passed he has a hope and even an assurance of safety.

---

[1] Levrets, that is, livrets.

[2] This passage seems to show that the young gentlemen amused themselves in winter, as the men of arctic expeditions do to this day, by issuing the equivalent of a newspaper, probably not printed but written out by hand. What would not we collectors of local literature be tempted to give for a complete set of the *Master William*, issued on Dochet Island in the winter of 1604-1605 !

[3] An equivalent for our "draw the teeth," viz., to subdue ?

[4] It is possible that Lescarbot here refers only to a possible attack by the English or some other Christian enemy, but his language seems rather to refer to some treachery or mutiny within the party itself, though there is no other evidence of such a thing. After all, though we know the main facts about the settlement, we know little of the life of those seventy-seven men during that winter on the Island.

[5] He must refer to a time when most of the men were incapacitated, and the few who could do the work needed rest between their toilsome voyages.

[6] Showing bad discipline, and also implying a lack of concerted action in obtaining water. It is quite probable that with a rigid discipline and com-

. . . .

The hard season being passed, the sieur de Monts, wearied of his sad stay on Isle St. Croix, considered hunting for another harbour in a warmer country farther to the southward. . . . .

. . . . And so the Sieur de Monts decided to return to St. Croix,[3] where he had left a goodly number of his men still weak from the effects of their winter's illness, for the safety of whom he was anxious. . . . .

CHAPTER VIII.

Arrival of the Sieur de Pont at Isle St. Croix. The Settlement removed to Port Royal . . . . .

The spring being passed in the voyage to the Armouchiquois,[4] the sieur de Monts awaited at St. Croix the time he had decided in which if there was no news from France he would set out to find some vessel of those which come to Newfoundland for the fishery, in order to return in it to France with his party if it were possible. This time had expired, and they were ready to set sail, not expecting any aid or assistance, when the Sieur de Pont, surnamed Gravé, resident of Honfleur, arrived with a company of some forty men, to relieve the suspense of sieur de Monts and his party. This was to the great satisfaction of everyone, as can readily be believed, and cannonading was not wanting according to custom, nor the blaring of trumpets. The said

---

pulsory exercise, etc., the horrors of the scurvy would have been much lessened, but it must be remembered that the subject was very little understood at that time.

[1] This tree, so called by the Indians at Quebec in 1535-1536, appeared to heal Cartier's party of the scurvy. Its identity is unknown, but it is generally supposed to have been some evergreen.

[2] On the identity of these few see earlier, note 3, page 170.

[3] After his voyage to Cape Cod, described in Lescarbot's work.

[4] Indians of Massachusetts.

> sieur de Pont not knowing the state of our French men thought to find there a settlement quite assured, with buildings ready; but because of the accidents of the strange malady of which we have spoken it was decided to change the location. The Sieur de Monts had strongly desired that the new settlement should be in forty degrees,[1] that is to say six degrees nearer the Equator than the situation of St. Croix; but after having seen the coast as far as Malebarre,[2] and with much care, without finding what he wanted, it was deliberated whether to go to Port Royal to make the settlement, awaiting the means to make a more ample exploration. Thus each one busied himself to pack up his baggage. They demolished that which they had built with a thousand labours, except the store-house, which was a piece too large to transport,[3] and in accomplishing this several voyages were made. All having arrived at Port Royal . . . .

Such are the original narratives of the first settlement on St. Croix Island. They include the only extant original sources of information upon the subject, and all later writers have derived their facts from these alone. Since no one of the three is complete, but each supplies something lacking in the others, it will be useful to bring together here in synopsis the chief events of the settlement, forming a sort of composite of the narratives.

On June 26 or 27, 1604, Sieur de Monts, accompanied by Sieur de Champlain and a few men in a small barque, entered Passamaquoddy Bay in search of a site for a permanent settlement. The party, or more probably the Sieur de Champlain exploring in advance of the main party in a small boat, discovered the island which de Monts named Sainte Croix, following a suggestion given him by the curious cross-formed meeting of the waters above it. Finding the situation charming, and all tho physical features of the island favourable for settlement and defence against the Indians, and the season growing late, they determined to establish themselves there. They at once fortified a knoll or nubble at the south end of the island as a temporary protection, while the barque was sent to the Bay of St. Mary in Nova Scotia to bring up the vessel and the remainder of the party. On the arrival of the latter, work was vigorously commenced upon clearing the island, erecting buildings, and making gardens. The plan of the settlement was prepared by Champlain, and is fully shown on a map and a picture-plan drawn by him (Figs. 8 and 9). It stood on the nearly level, elevated north end of the island in a situation easy to recognize, though every trace of the settlement has vanished. The principal buildings were the residence of the commander, and a strongly built storehouse, the materials for both of which had doubtless been chiefly, if not entirely, brought from France. These two, together with a third building serving as a general assembly house (and perhaps, too, as the general mess-room), were connected with one another by palisades, the whole forming an efficient fort, ample for protection against the Indians. Cannon were mounted also north of the settlement, on the knoll at the foot of the island, and on the bluff on the south east of the island. Near by were constructed other buildings,— barracks for the Swiss mercenaries, dwellings for the gentlemen and for the workmen, all of whom seggregated into groups according to their rank and tastes. An oven house and a kitchen were built, and a well was dug though it proved of slight service; and a water-mill for grinding grain was started, but not completed, on the mainland. The chapel was, seemingly, attached to the house of the priest, and another, little more than a large wigwam, was built near the foot of the island, probably for the use of the Indians, some of whom encamped there. All of the buildings, except the first mentioned, were doubtless built of logs, but with doors, windows and chimneys brought from France, and it is likely that they were badly built, as the carpenters must have been new to this kind of construction. Gardens were laid out both among the dwellings, and on the level ground southward of the settlement (Fig. 14), and also on the mainland of both banks of the river and at the falls near the present Calais and St. Stephen, and many grains and other seeds were planted. In the autumn some of the party returned in the vessels to France, leaving de Monts and some 76 men on the island. The winter set in very early and proved exceptionally severe. The cold north winds swept down the river, little broken in force by the thin fringe of trees left around the island, and penetrated the badly constructed dwellings, imperfectly heated by their charcoal fires, or by their ravenous fireplaces for which little wood could be got. Great quantities of ice formed in the river, so that it became very difficult, and sometimes impossible, to fetch wood and water in their small boat from the mainland, and for the same reason little fish or other fresh food could be obtained. The men, weakened by the cold, by labour on the hand mills and by watching against possible treachery from the Indians, and, perhaps, from some among their own number, with blood impoverished by the salt food, bad water and little exercise, fell sick with the scurvy. This soon got so far beyond the skill and control of the surgeons, that nearly half of the men died, and most of the remainder, all except a dozen of the most active persons, (probably the gentlemen of the party who kept up health by active games, and spirits by writing amusing pamphlets), were in various stages of illness. The care of the sick wore upon the well, and it was only the return of spring which saved them from a like illness and allowed the sick to recover. So great were their sufferings that all became utterly discontented with the place of settlement, and when the relief ship arrived in the middle of June, she was hailed with the greatest manifestations of joy, and it was resolved to abandon the place. The settlement was then removed to Port Royal in Nova Scotia.

---

[1] His charter gave him rights of settlement as far south as 40°, viz., to the vicinity of the present City of Philadelphia. It is very surprising that he did not find, in his search along the coast as far as Marthas Vineyard, any place which seemed to him as favourable for settlement as Port Royal. The history of New England would have been somewhat different for a time had he found a site on Massachusetts Bay, or had he directed his voyage in 1604 to latitude 40° instead of to Canso.

[2] Cape Cod.

[3] Apparently all the good woodwork, especially that brought from France, excepting that of the Magazine, was transported to Port Royal, while the rougher log buildings were left behind.

Before passing to the later history of the island, there are three subjects connected with the first settlement worth a brief discussion,—the exact date of the discovery of the island, the Indian traditions as to the settlement, and a current misconception as to certain early religious services on the island.

The date of the discovery of St. Croix Island is, unfortunately, nowhere stated, nor is there any conclusive incidental evidence in the narratives bearing on the subject. De Monts with his party left St. Mary's Bay on the 16th of June, and eight days later, on June 24th, after exploring around the head of the Bay of Fundy, discovered the St. John. They appear not to have remained long, and probably left on the 25th. Allowing for their slow progress in a small open barque, entering every harbour and promising place for a settlement, they could hardly have reached St. Croix Island in less than two days, that is, June 26th or 27th. This is confirmed by certain other facts from the narratives. Putting together the narratives of Champlain and Lescarbot, we find that a barricade was immediately made on Isle St. Croix, after its discovery, and as soon as it was finished, a messenger, Champdoré, was sent in the barque to St. Mary's Bay to bring up the vessels with the rest of the party. On reaching St. Mary's Bay they discovered Nicolas Aubry, who had been lost in the woods for 16 or 17 days. Now, he had been lost four days before June 16, that is June 12; hence he must have been found on June 28 or 29. Now, as it must have taken Champdoré a day to cross to St. Mary's Bay, and the party a day to erect the barricade, the island must have been discovered at least two days before June 28 or 29, that is, on June 26 or 27. We may imagine they left the St. John on the 25th, reached St. Croix Island on the evening of the 26th, spent the 27th in erecting the barricade, and sent Champdoré to St. Mary's Bay on the 28th, on which day or the next he discovered Aubry. We may thus best accept June 26 as the most probable date, with the 27th as a possible alternative.

It will be of interest to inquire what traditions the Indians of the region have as to the settlement, for not only will these be of some interest in themselves, but, with our full knowledge of the real discovery, they will afford a test of the accuracy of Indian tradition. I have not made any attempt to obtain traditions which may still exist among the Passamaquoddies, (not having thought of it when I had the opportunity), but some information on the subject exists. Thus, in 1796-1797, the testimony of certain Passamaquoddy Indians was taken for the use of the Boundary Commission, later to be explained, and this testimony still exists in MSS. among the Commission's records, a set of which I have been privileged, through the generosity of their present owner, Rev. Dr. Raymond, of St. John, to use. One of the traditions, thus given by Francis Joseph, is as follows:—

> That the French about four hundred years ago came to this part of the Country with one vessel. That they first came to Head Harbour and Harbour Le Tang; and from thence went up the River Magaquadavic in a Boat, where they saw some Indians—That not liking the Land they came down the river, and erected a Cross at its mouth; and then returned to France. That the next time the French came here in four Vessels and set down at an Island near Devils head, where a Malady assailed them by drinking bad water; of which a great number died and the rest returned to France.

Another Indian, Nicola Awawas, testified:—

> that there was a fort on the great island—that he understood the French first landed at—Megagwadavy and that they came to St. Andrew's Point and then they went to Muttanagwamis [Dochet], that the first time the French came there were two vessels and one remained here, and when they came again they found that all the men who remained had died and the vessel which came the second time finding that all the men who had remained were dead went away.

Again, a document, giving a summary of these traditions as obtained from several Indians in 1796, is printed by Kilby in his "Eastport and Passamaquoddy" (page 114), from which the following sentences are taken:—

> That two or three hundred years ago the French came in three or four ships to Passamaquoddy Bay, entered at the L'Etete Passage and erected a cross at the entrance of the Magaguadavic River, upon Point Meagique, that they soon after removed and erected a cross upon St. Andrews Point, on St. Andrews day celebrated Mass there and gave it the name of St. Andrews; that at the time the Indians were clothed in skins, which the French purchased of them, and gave them in return knives, hatchets, and ruffled shirts, that the French at their request set blacksmiths to work on board the ships, and furnished them with such iron instruments as they described their want

> of; that the French remained long enough to load the ships with furs and then returned to France. That the next year they came again with four ships and went to the small island at the mouth of the Scoudiac River,; that this island was the place of resort for the Indians to deposit their articles both in going up and coming down the Scoudiac River, and has a name describing that as its use; that the French landed there and remained some months, but finding that the water upon the island was not good, and had a poisonous quality, and that a mortality as they supposed from that cause prevailed among them, they went away; that at this time they did not traffic; that all the adjacent country was full of Indians; that the French came to this small island because they could there defend themselves; that they did not go to any other island or remain on shore at any other place, from their fear of the Indians, who were not willing that they should land upon the main, or any large island, lest they should claim a right of possession. That this island was larger than it now is, and that the sea has washed it away from the rocks on the lower side. That the small hill or island towards the sea had always remained distinct by itself, and the water on the inside and near to it is very deep.
>
> In further conversation they said that after erecting the cross at the Magaguadavic, the French Priest went up to the forks of that river, and there put some earth in his handkerchief, and said "this is the place."

Another tradition of about the same time (given in the "Courier Series," No. XXIV.) states that the Indians used to lie in wait for the French as they landed from the island.

These testimonies, in comparison with the known facts, do not allow us to entertain a very high regard for the accuracy of Indian tradition. But it must be conceded that there is in them a certain substratum of truth, and that probably they are less accurate than they would be were it not for a confusion of several voyages in the minds of the Indians. It is possible, for instance, that the visits of other early French traders who entered this bay are here confused with those of de Monts, and it is probable that the tradition about the naming of St. Andrews[1] may be substantially correct, though belonging to a much later period.

We may next consider an erroneous supposition originated by Willis in the "New England Historical and Genealogical Register," Vol. XV., 1861, 212, 213, that Protestant religious services, the first held in North America, north of Florida, were held on the island in 1604-1605. The evidence is based upon a combination of two passages in Lescarbot's History. One, (page 461 of the 1612 edition), beginning "Je demanderois" (given earlier, page 174), Willis interprets as a protest by Lescarbot against the settlement, whence he infers that Lescarbot was at the island in 1604. But this is simply a mistranslation of *demanderois*, which means simply "I would ask," etc., and introduces a question, while the evidence is perfectly conclusive that Lescarbot was not in Acadia until two years later. Second, Willis interprets a passage, on page 490 of the 1612 edition, in which Lescarbot says he gave religious instruction to the people at the request of Poutrincourt, as referring to St. Croix Island. But this, as the context shows, although coming in a chapter describing events at St. Croix Island, occurs in a digression relating to his own student habits, and refers to Port Royal, and not to St. Croix Island.

---

[1] Discussed in Acadiensis, II., 184.

In this connection we may note an interesting incident which may have happened at Isle St. Croix. As Champlain tells us in the edition of his works of 1632, the party with de Monts included both Protestants and Roman Catholics, and had with it both priests and ministers. Now, Sagard, in his Histoire du Canada, of 1636 (page 9), speaking of the unfortunate effects of religious disputes upon the men when Catholic priests and Protestant ministers were allowed to go together upon expeditions to the New World, says:—

En ces commencemens que les François furent vers l'Acadie; il arriua qu'un Prestre & un Ministre moururent presque en mesme temps, les matelots qui les enterrerent, les mirent tous deux dans une mesme fosse, pour veoir si morts ils demeureroient en paix, puisque viuants ils ne s'estoient pû accorder.

TRANSLATION.

In the first ventures made by the French in Acadia, it happened that a priest and a minister, having died at almost the same time, the sailors who buried them, placed them together in a single grave to see whether when dead they would remain together in peace, since living they were never able to agree.

It is not, of course, certain that this incident occurred at St. Croix Island, but the indications point to the island as its location.

So much for the history of the island down to the removal of the settlement to Port Royal. Only once more does Champlain have any connection with it. He visited it along with Poutrincourt on September 7, 1606, which visit he describes as follows:—

CHAPITRE XIII.

[113] . . . . Le lendemain fusmes dedans vne chalouppe à l'isle de S. Croix, où le sieur de Mons auoit yuerné, voir si nous trouuerions quelques espics du bled, & autres graines qu'il y auoit fait semer. Nous trouuasmes du bled qui estoit tombé en terre, & estoit venu aussi beau qu'on eut sceu desirer, & quantité d'herbes potageres qui estoient venues belles & grandes: cela nous resiouit infiniment, pour voir que la terre y estoit bonne & fertile.

TRANSLATION.

. . . . The next day we proceeded in a shallop to the Island of St. Croix, where Sieur de Monts had wintered, to see if we could find any spikes of wheat and other seeds which we had planted there. We found some wheat which had fallen on the ground, and come up as finely as one could wish; also a large number of garden vegetables, which also had come up fair and large. It gave us great satisfaction to see that the soil there was fair and fertile.

This was Champlain's last visit to the island. In September, 1607, he returned to France, and later became the Father of New France, but he came no more to Acadia.

Lescarbot mentions this visit in the following words:—

CHAP. XIIII. [*i.e.*, XIII.]

[553] . . . . sieur de Poutrincourt . . . . visita ladite ile, là où il trouva du blé mur de celui que deux ans auparavant le sieur de Monts avoit semé, lequel estoit beau, gros, pesant, & bien nourri. . . . .

CHAP. XV.

[557] . . . . Apres avoit à fait, vne reveuë, & caressé les Sauvag. qui y estoient . . . .

TRANSLATION.

. . . . Sieur de Poitrincourt . . . . visited the said Island, where he found ripe wheat, of that which two years before the Sieur de Monts had sown, which was fine large heavy and well-filled out. . . . After having made there a review and having conciliated the Indians who were there . . . .

A year later, in July, 1607, Lescarbot himself in company with Poutrincourt, visited St. Croix Island, of which he speaks thus:—

[590] . . . . *Etat de l'ile Saincte-Croix.* . . . .

CHAP. XVIII.

[600] . . . . Arrivez que nous fumes dans ladite ile de Saincte Croix, nous y trouvames les batimens y laissez tout entiers, fors que le magazin estoit découvert d'vn côté. Nous y trouvames enco-[601]re du vin d'Hespagne au fond d'vn muy, duquel nous beumes, & n'estoit guere gaté. Quant aux jardins nous y trouvames encore des choux, ozeilles & laictues, dont nous fimes cuisine. Nous y fimes aussi de bons patez de tourtres qui sont là frequentes dans les bois. Mais les herbes y sont si hautes, qu'on ne pouvoit les trouver quand elles estoient tuées & tombées à terre. La court y estoit pleine des tonneaux entiers, lesquelz quelques matelotz mal disciplinez brulerent pour leur plaisir, dont i'eu horreur quand ie le vi, & jugeay mieux que devant que les Sauvages estoient (du moins civilement) plus humains & plus gens bien que beaucoup de ceux qui portent le nom de Chrétien, ayant depuis trois ans pardonné à ce lieu, auquels ilz n'avoient point seulement pris vn morceau de bois, ni du sel qui y estoit en grande quantité dur comme roche.

TRANSLATION.

CHAPTER XVIII.

. . . . *State of St. Croix Island.* . . . .

. . . . Having arrived at the said St. Croix Island, we found there the buildings which had been left all entire, except the magazine which was uncovered on one side. We found there also in the bottom of a pipe Spanish wine of which we drank and it was of good flavor. As to the gardens, we found there also cabbages, sorel and lettuce, which we cooked. We made there also good pies from the pigeons which are frequent there in the woods. But the grass there is so high that one cannot find them when they are killed and fall to the ground.[1] The courtyard there was full of whole barrels, which our badly disciplined sailors[2] burned for pleasure, which horrified me when I saw it and I saw better than before that the Indians were (at least in manners) more humanized and better people than many of those who bear the name of Christians, having for three years spared this place from which they had not taken a single morsel of wood, nor of salt which was there in a great quantity as hard as rock. . . . .

We have now to trace the history of the island for the remainder of the period, and brief enough it is. The records are to be found chiefly in the Relations of the Jesuit Missionaries, from which the following quotations are taken.

After 1607, no mention of the island occurs until 1610, in which year, as related by Lescarbot, Sieur de Poutrincourt in a voyage,

vindrent à Sainte Croix premiere habitation de noz François en cette côte, là où ledit Sieur fit faire des prieres pour les trespassez qui y estoient enterrez dés le premier voyage du sieur de Monts en l'an 1603.

TRANSLATION.

came to Saint Croix, the first settlement of our French upon this coast, where the Sieur had prayers offered for the dead who had been buried there since the first voyage made by Sieur de Monts, in the year 1603 [1604].

(*Relations II., 132-133.*)

Thus, touchingly and appropriately, with prayers for the repose of those who died in that first sorrowful winter, ends the connection of Poutrincourt, last of the comrades of de Monts in Acadia, with St. Croix Island.

---

[1] Human nature changes little with the progress of the Ages! Lescarbot is not the only hunter who has explained his return without game as due to his inability to recover that which he has killed!

[2] This confirms the supposition as to the bad state of discipline among the French sailors of the time, which must have made their management under such circumstances as prevailed at St. Croix Island in the winter of 1604-1605 very difficult.

The next year, 1611, came another incident in its history, when a trader, Captain Platrier, seated himself there, and passed the following winter upon it, as recorded in the Relations of Father Biard.

. . . . nous apprinsmes que le capitaine Platrier s'estoit resolu de passer l'Hyuer en l'Ile saincte Croix, & qu'il y estoit resté luy cinquiesme. Cette nouuelle fit prendre resolution au sieur de Biencourt d'aller à Saincte Croix de ceste mesme tirade, auant que le Capitaine Platrier eust moyen de se fortifier; car il vouloit tirer de luy le Quint de toutes ses marchandises, & traicte, parce qu'il hyuernoit sur le pays. L'Isle Saincte Croix est à six lieües du Port aux Coquilles, au milieu d'vne riuiere.

Doncques le sieur de Biencourt y vint, accompagné de huict personnes, & y entra en armes, ayant laissé le P. Biard en vn bout de l'Isle, sur des roches attendant l'euenement, parce que ledict Pere auoit conuenu auec ledict sieur, qu'en cas d'aucune inuasion, ou actes de guerre, ou force contre les François, il seroit delaissé en quelque lieu à l'escart, en telle façon, qu'vn chacun peust sçauoir, qu'il estoit amy de tous les deux partys, & qu'il s'entremettroit fort volontiers pour accorder les differents, mais nullement pour estre partialiste.

Dieu mercy, tout passa heureusement: Platrier nous traicta le mieux qu'il peut: Et à son ayde le sieur de Biencourt recouura vne barque. . . . .

TRANSLATION.

. . . . We learned that Captain Platrier had decided to pass the Winter on the Island of sainte Croix, and that he [Sieur de Biencourt] would get his fifth therefrom. This news made Sieur de Biencourt resolve to go to Sainte Croix at once, before Captain Platrier had means of fortifying himself: for he wished to collect from him the Fifth of all his merchandise and trade, for wintering in the country. The Island of Sainte Croix is six leagues from Port aux Coquilles,[1] in the middle of a river.

Accordingly sieur de Biencourt went to this place, accompanied by eight people, and, well-armed, marched into the place, having left Father Biard in one end of the Island upon the rocks, awaiting the outcome; because the Father had arranged with the sieur, that in case of any invasion, or warlike act or force against the French, he should be left in some place apart. so that every one might know that he was a friend of both parties, and that he would very willingly interpose to make peace between those at variance, but under no circumstances would be take sides with either.

Thank God, all passed off happily: Platrier treated us as well as he could: and with his aid. Sieur de Biencourt recovered a barque. . . . .

(Relations III., 198-201.)

Biencourt was the son of Poutrincourt and at this time was in command in Acadia, and entitled to a fifth share of all trading profits.

Later in the same year, Father Biard with Sieur de Biencourt again visited St. Croix Island:—

nous repassasmes à l'Isle S. Croix, où Platrier nous donna deux barils de pois, ou de febues: l'vn & l'autre nous fut vn bien grand present.

---

[1] Head Harbour, on Campobello.

TRANSLATION.

we passed on to the Island of Ste. Croix, where Platrier gave us two barrels of peas or beans; they both proved a very great boon to us.

(*Relations, III., 224, 225.*)

That Captain Platrier really spent the winter of 1611-1612 on St. Croix Island is attested by a statement in a letter of Father Biard (Relations, II., 26, 27). Whether he or anyone else wintered there in 1612-1613 we do not know, but in the next year, 1613, occurred the final event in the history of the buildings on St. Croix Island. In the summer of that year, Captain Argal was sent by the English of Virginia to drive the French from the Bay of Fundy. He captured Father Biard at Mount Desert, and what followed, we will allow the good Father himself to tell in his letters to his Superior in France.

Hic quoque iterum nobis periculum. Volebant ire Angli, ut ante dictum est, ad habitationem Sanctae Crucis, etsi in ea nulli tunc habitatores essent. Sed erat sal ibi relictum. Nemo praeter me viam sciebat: atque ibi me aliquando fuisse Angli norant. Rogant igitur ut eos deducam. Ego qua possum tergiversari et evadere ; sed nihil proficio. Vident aperte me nolle. Hic nimirium inconditur capitaneus, et eram jam periculo propior ; cum subito sine me ipsi locum reperiunt diripiunt et incendunt.

TRANSLATION.

Here a new peril arose. The English, as I have previously stated, wished to go to the settlement of Sainte Croix, although it had at this time no inhabitants. Some salt, however, had been left there. No one except myself knew the way; and the English knew that I had been there formerly. They accordingly demand that I lead them. I do all I can to evade and refuse this proposal ; but it avails me nothing. They perceive clearly that I am unwilling to obey. At this the captain grows very angry, and my peril becomes imminent; when suddenly they find the place, without my help, and plunder and burn it.

(*Relations, III., 10, 11.*)

In another place, his Relation of 1616, Father Biard gives another account of this event.

De sainct Sauueur ils addresserent à S. Croix, ancienne habitation du sieur de Monts, & parce qu'ils auoyent sceu, que le P. Biard y auoit esté, Argal vouloit qu'il les y conduisit, mais ledit Pere ne le voulut point, ce qui le mit entierement en la disgrace dudit Argal, & en grand danger de sa vie. Ce neantmoins Argal roda tant en haut qu'en bas, & rechercha tant tous leurs endroits, les confrontans auec les cartes, qu'il nous auoit prinses qu'en fin il la trouua de soy-mesme ; il en enleua vn bon monceau de sel, qu'il y trouua, brusla l'habitation & destruisit toutes les marques du nom & droict de France, ainsi qu'il auoit en commandement.

TRANSLATION.

From saint Sauveur they sailed for Ste. Croix, Sieur de Monts's old settlement ; and, as they knew that Father Biard had been there, Argal wished

him to conduct them thither; but the father would not consent to do so. This caused him to be in complete disgrace with Argal, and in great danger of his life. Notwithstanding this, Argal wandered about, up and down, and, by dint of searching all places thoroughly and comparing them with the maps which he had taken from us, he at last found the place himself. He took away a good pile of salt, which he found there, burned the settlement, and destroyed all traces of the name and claims of France, as he had been commanded to do.
(*Relations, IV.*, *36, 37.*)

But once more in this period does St. Croix Island make its appearance in the records of history. In 1632, Isaac de Razilly, following nearly in the footsteps of de Monts as a colonizer of Acadia, received a great grant from the King of France, described in the following terms:—

L'étendüe des terres & pays que ensuivant, à sçavoir la rivière & baie Saincte-Croix, isles y contenues, & terres adjacentes d'une part & d'autre en la Nouvelle France, de l'étendüe de douze lieües de larges, à prendre le point milieu en l'isle Saincte-Croix, ou le sieur de Mons à hiverné, & vingt lieües de profondeur depuis le port aux coquilles, qui est en l'une des isles de l'entrée de la rivière & baie Saincte-Croix, chacque lieües de quatre mille toises de long.
("*Memorials of the English and French Commissaries,*" *Paris, 1755, page 707.*)

TRANSLATION.

The extent of land and territory following, that is to say, the river and bay of Saint Croix, the islands contained therein, and the adjacent country on both sides in New France, in the extent of twelve leagues in breadth, with its middle point in St. Croix Island, where the Sieur de Monts wintered, and twenty leagues of depth from the Port Aux Coquilles [Head Harbour], which is in one of the islands at the entrance of the river and bay of St. Croix, each league of four thousand fathoms in length.

It is easy enough to lay down this grant upon a modern map, and the curious reader may find it thus shown with other early French grants upon a map in an earlier volume of these Transactions.[1] But de Razilly died before he could carry out his plan for colonization, and his grant lapsed. There is not the slightest evidence that he ever even saw Isle St. Croix, much less attempted to settle upon it.

Thus ended the history of Isle Sainte Croix in the Acadian period. Acadian settlers in small numbers lived in the vicinity towards the close of the seventeenth and early in the eighteenth century, but none of them are known to have occupied the island. Nor in any other way, in document, or on map, does it make any appearance during the remainder of the long Acadian period, which ended with the Treaty of Paris in 1763 and the cession of all Acadia to England.

---

[1] Vol. V., 1899, section ii., page 313.

2. The Part of St. Croix Island in the Boundary Controversies, and in the Determination of the River St. Croix as the International Boundary, 1796-1799.

So Isle St. Croix vanished from original historical records in 1632. It does not again come into notice in any way whatsoever that I can find until 1772, one hundred and forty years later, when it appears, named Bone Island, upon Wright's fine map of the Passamaquoddy Region, a map based upon the first accurate surveys of this part of the world. Wright's map has not been published, but exists in manuscript in the British Museum and in the Public Record Office at London, and, from a copy of the former, Bone Island and its surroundings are here reproduced (Fig. 10), giving us the earliest modern map of the island. As to the name assigned to it, Wright obtained it from some of the several settlers then living at Passamaquoddy, for in certain testimony given by him before the Boundary Commission in 1797 (preserved in Ms. among the records of the Commission), he testifies that the names on his map were not given by him, but were "obtained from the Inhabitants of the District." A probable reason for the origin of the name has been given earlier in this paper (page 169). But with this map the island again vanishes, not to reappear, so far as I can find, until 1796, when it becomes prominent in certain

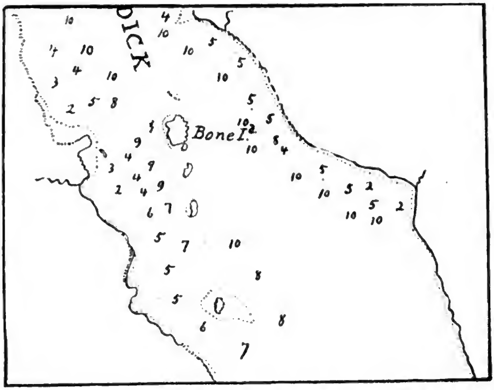


FIG. 10.—Earliest modern map to show the Island. From Wright's Ms. "Plan of the Coast from the West Passage of Passamiquodi Bay to the River St. John," 1772. Original size.

documents of the Boundary Commission,— but thereby hangs an historical tale, which must be briefly related

The Treaty of Paris in 1783, which formally closed the unhappy war of the Revolution, established the St. Croix river from its source to its mouth as a part of the International Boundary between the United States and the British Possessions. This was the natural international boundary in this region, for it was the old boundary between Massachusetts, then including Maine, which had led the Revolution, and Nova Scotia, then including New Brunswick, which had remained loyal to Great Britain. The Treaty was not a year old, however, before disputes arose locally as to the identity of the River St. Croix of the Treaty, the British residents claiming the present river of that name, and the American residents claiming the Magaguadavic. Its seems strange to us, with our accurate modern historical and geographical knowledge, that there could have been any doubt upon the subject, but if we view it in the light of the imperfect knowledge of that time, the origin of the controversy becomes clear. All that was definitely known about the River St. Croix was that it was one of the rivers emptying into Passamaquoddy Bay which had been named by the French when they settled there. But all tradition of de Monts' settlement had long since vanished, and there was nothing known to the residents to enable them to determine which of the several rivers emptying into Passamaquoddy was the true St. Croix, or even how the identity of the river was determined. The earlier attempts which had been made to identify the river when it was the boundary between Massachusetts and Nova Scotia only confused the issue, and the best maps of the time threw no light upon it. Thus, in 1764, when John Mitchel was sent by the Governor of Massachusetts to identify the River St. Croix, he was told by the Indians that the Magaguadavic was the river so called by them. This testimony of the Indians was valueless, for we now know that the St. Croix was not the Magaguadavic, and, moreover, the Indians the very next year, 1765, told Morris, a Nova Scotia surveyor, that the Cobscook was known to them as the St. Croix.[1] Nevertheless, their statement to Mitchel, apparently confirmed as it was by the maps of the time, naturally enough, led the people of Massachusetts, and, after 1783, the people of the United States, to believe that the Magaguadavic was the St. Croix, and hence, should form the International Boundary. The best maps of that time gave a certain support to this view, for they showed two large rivers emptying into what was supposed to represent Passamaquoddy Bay, and of these two the easternmost was named the St. Croix. We now know that the maps contained a very curious error in the supposed Passamaquoddy Bay which made them utterly misleading, and we now know further that the river named on them the St. Croix is really the present river of that name; but these facts were then unknown, and the supposition that the Magaguadavic was the St. Croix was most natural under the circumstances. The British claimed the present St. Croix as the St. Croix of the Treaty, chiefly on the ground that it was the larger river and the most natural to be selected as the international boundary, but they had no positive historical evidence to offer in its support, and so far their case was weaker than that of the Americans. Such was the condition of affairs during the decade after the close of the revolution, and much local friction and no little embarrassment to the two governments was caused by the uncertainty as to this boundary. Finally, the question became so pressing that in 1794 the United States and Great Britain entered into a Treaty, providing for leaving the question as to the identity of the River St. Croix meant by the Treaty of 1783, to a commission of three men, one to be appointed by each nation, and these two to choose a third, the decision of any two of them to be accepted as final. Accordingly, Great Britain chose Thomas Barclay, a prominent loyalist of Nova Scotia, and the United States chose David Howell, an eminent citizen of Rhode Island, and those two agreed upon Egbert Benson, a leading lawyer of New York, as the third commissioner. The British agent, to argue the British claim, was Ward Chipman, a leading loyalist of St. John, while the American agent was James Sullivan, one of the most eminent lawyers of his time in Massachusetts. The secretary of the commission was Edward Winslow, another New Brunswick loyalist. The commission assembled at St. Andrews, New Brunswick, in August, 1796, transacted much routine business in connection with its organization and the making of surveys, and gathered all the local information it could from residents and Indians. The members personally visited the Magaguadavic and the Scoodic (or present St. Croix), examined the various islands in them, and then adjourned to meet the next year in Boston. It was, of course, known to the commissioners from the start that the St. Croix river was named by de Monts, and that he had settled on an island within its mouth, but on their visits to the various islands they did not have with them Champlain's original narratives and maps, but only some extracts from his narratives, quite insufficient of themselves to determine the identity of the island and river. The American agent endeavoured to convince the commissioners that an island, now called Hog Island, near the mouth of the Digdeguash, was the island described by Champlain, thus seeking to sustain his contention that the Magaguadavic was the St. Croix. The British agent appears to have hit upon the correct island, namely, Dochet, as Isle St. Croix, but apparently the commissioners were then unconvinced by either. When the commission met in Boston in August, 1797, very lengthy arguments were submitted by the agents of the two countries. The British agent traced the history of the River St. Croix of the Treaty, and argued that it was the same as the River St. Croix of all the earlier charters, etc., and the same as the St. Croix in which de Monts had wintered in 1604, and he claimed that the Scoodic (the present St. Croix) was that river. The American agent, on the other hand, claimed that the River St. Croix of the Treaty of 1783 was not that of the ancient charters, but the river locally so called, and so represented upon the maps of the time, especially on Mitchell's map of 1755 which was admitted to have been used by the negotiators of the treaty in their deliberations, regardless of whether this was the ancient St. Croix of de Monts and Champlain or not. The former St. Croix he claimed to be the Magaguadavic. The commissioners, as their decision shows, unanimously decided that the contention of the British agent was correct, a decision which is fully in accord with the evidence and, indeed, the only one possible in the light of a full knowledge of the subject. The question then resolved itself into this, which of the rivers was the St. Croix of de Monts and Champlain? Happily this question was answered even before it was asked, and here St. Croix, or Dochet, Island steps once more upon the scene. In June or July, 1797, Mr. Chipman, the British agent, received from Europe a copy of Champlain's map of 1604 (fig. 8), which now became known to the members of the commission for the first time. He sent a copy of this map to Robert Pagan, a prominent citizen of St. Andrews, who, guided by the map, proceeded to Dochet Island; but we will let him tell his own story, in his own words. It is contained in a deposition laid before the commission, and preserved among their papers.

---

[1] This subject is treated fully in the writer's "Monograph of the Evolution of the Boundaries of the Province of New Brunswick," in the preceding volume of these Transactions.

> Robert Pagan Declares, that having obtained a Plan of St. Croix Island said to have been publish at Paris Anno 1613 and having compared it with the Shore Coves and Points of the Island laying a few miles below the mouth of Scoodiac River at the Devils Head commonly called Doceas Island, and also with the shores &c^{a} of the main Land westward and Eastward of it, as laid down in that Plan, and having found a most striking agreement between every part of these shores, coves and points and that plan.
>
> He on the 7th day of this Instant July went to said Doceas Island accompanied by William Cookson, Thomas Greenlaw, Nehemiah Gilman and John Rigby for the purpose of making further discoveries there. On the North End of said Doceas Island where in the plan above mentioned the French

buildings are laid down, he found four distant Piles of ruins agreeing in their situation and distances from each other with the spot at A, as laid down in that plan, and these four Piles of Ruins are directly abreast of the long sandy Point at low water in said Plan.

On examining these Piles he found them considerably raised above the general level of the Ground around them, some parts of them covered with roots of Trees and wind Falls, and all of them with mould or rotten leaves from six to eighteen inches deep.

On further examining he discovered distinctly several tiers of stone in each of the Piles laid in clay mortar, one on the Top of an other, the Clay is perfectly distinct from the stone, and of the usual thickness (between the Tiers of stone) of mortar made use of in laying Stone or Brick at this Day.

In some parts of these ruins the Clay is as soft and Perfect as if newly dug out of a Pit, and in other parts appears as clay does in chimnies where fire has been, and there are evident marks on the stone in many Places.

In diging he found charcoal in a perfect state only it was easily crumbled to pieces in handling he also found part of a stone Pitcher in full preservation. One one side of one of the Piles he discovered a number of Bricks, so laid together as to convince him that a large oven has formerly been built there, all these Bricks are in a tolerable state of preservation. He further Declares—that on the 18th day of this Instant, July being at said Doceas Island on a party of pleasure with a large Company part of the Company went with him to view the ruins above described, and on further examination in presence of John Brewer Esqr., John Campbell, The Revd. Mr. Andrews, Daniel McMasters Esq., Donald McLauchlan, Donald Grant, William Pagan and Thomas Pagan. He uncovered another Pile of Ruins distinct from the four Piles found on the 7 Instant which they found to be laid in clay mortar with Tiers of Stone in the same manner as the first four Piles are laid.

In diging with a spade for a few minutes near one of these piles they turned up a metal spoon, a muskett Ball, a piece of an earthen Vessel and a spike Nail all of which shew evident marks of having laid a long time under the surface.

He further in presence of these Gentlemen discovered on that part of the Island agreeing with the spot in the plan between A & B a ledge of Rocks extending from the middle of the Island towards the shore on each side a considerable breadth in many places the Rocks are some height above the surface and in other places the Ledge is lightly covered with earth and leaves.

That this Declaration may be more fully understood he has affixed the plan refered to.

(Signed), ROBERT PAGAN.

St. Andrews 20th July 1797.

Personally appeared before me Daniel McMaster Esqr. one of his Majesty's Justices of the Peace for the County of Charlotte Robert Pagan Esqr. also made oath to the truth of the Declaration contained in the first and second pages of Sheet of Paper subscribed by him.

(Signed), DANL MCMASTER, J.P.

(From the Boundary MS. in possession of Rev. Dr. Raymond: given also by Kilby in his "Eastport and Passamaquoddy," pages 124, 125.)[1]

---

[1] There is a reference to this discovery in a letter by Barclay of Sept. 8, 1797, in Rives' "Life of Barclay."

But this is not the only testimony on the subject. Later in the same year Thomas Wright, Surveyor-General of Isle St. John (Prince Edward Island), the maker of the map of 1772, already referred to (earlier, page 197), visited Passamaquoddy on behalf of the Boundary Commissioners, and on October 24, 1797, gave sworn testimony as follows (Ms. hitherto unpublished among records of the Boundary Commission):

> . . . . Since being summoned to attend the Commissioners appointed as aforesaid, I have bestowed every attention towards informing myself on the Subject of their investigation: Have perused the several publications of voyages made by the French to Acadie; their Discoveries thereupon, and consequent Settlement made (by Monsrs. de Monts, Poutrincourt, Champlain, Lescarbot and others), on a small island which they named Isle de Sainte Croix, called on my said plan, Bone Island, situated in the midst of the River Scoodiac or Great River St. Croix.—I have also critically examined those French Settlers plan of the said Island: handed to me by Ward Chipman Esqr. His Britannic Majesty's Agent &c. Have compared it in every particular respecting the situation (as described by the said French Settlers) its measurement, shape, &c. with that of my said Survey made in 1772; and find such the said French Description and plan of the said Isle de Sainte Croix, so very nearly to correspond therewith as to leave me not the least room for doubt, that the said Isle de St. Croix or Bone Island was the Identical spot on which the said Frenchmen made their settlement sometime about or between the years 1604 and 1614.—there is no other situation to be found in the circuit if the whole Bay of Passamaquoddy to which such the said French Description of and plan would in the least apply to; so that taking the whole into consideration I have every reason most assuredly to believe that the said River Scoodiac is the true and antient named River St. Croix.

On the same date, Thomas Wright also swore to the following testimony, likewise now published for the first time from the Ms. in the records of the Boundary Commission. It will be noted that it is of very great local interest.

> The Deposition of Thomas Wright, Esquire, His Majesty's Surveyor General of the Island of St. John in the Gulph of Saint Lawrence, respecting what he saw of Remains of Habitations on Isle de Saint Croix, or Bone Island &c. whilst on the Survey thereof October the eleventh and twelfth one thousand seven hundred and ninety-seven—in company with Robert Pagan, Esquire, and a party of men assisting upon the said Survey &c.
>
> Thomas Wright, Esquire, above named, upon his Oath doth testify and declare that—
>
> 1st. He examined the Foundation of a building (as the People cleared away the Trees, Rubbish, &c.) in Form of an oblong square, which he measured with a six Feet Rod; and found one Side twenty Feet long, laying in the Direction (by his pocket compass) of North North East and South South West—The other side at right angles to it (and facing nearly the North End of the Island) measured sixty-six Feet in Length, the remaining two Sides of

the oblong square measured the same.[1]—At about twenty-four Feet from the Southern End of the said Foundation, towards the Middle of the area thereof, he observed a large Heap of Stones, with some Bricks of a light yellow colour which measured eight Inches long—four broad—and one Inch and four-tenths in Thickness; which Heap of Stones and Bricks—evidently appeared to have resulted from the tumbling down of a Stack of Chimnies[2]; and (upon removing the upper part of the Rubbish) was regularly bedded in a stiff light coloured clayey mortar: as in like manner, was the whole of the said Foundation.—Some of the Stones about this supposed Chimney-Heap appeared black, as if burnt on one Side:—There was, also, some Charcoal about the said Heap, that appeared in its usual Form; but easily crumbled, when squeezed between the Fingers, as rotten:—there was, also, (about the said Heap) some pieces of very hard burnt Earthen Ware.—And this Deponent further saith that he took some Bricks from under a Cedar and Fir Tree (whilst the people were grubbing and pulling them down) which trees measured from ten to twelve Inches through at their But:—there were, besides, Wind Falls of rotten Trees, over the said Foundation, about eighteen or twenty Inches in Diameter; and various Roots of Trees that had insinuated themselves between almost all the Stones of the said Foundation to the Earth, beneath.—

2nd. In the Direction of about South by West (by his pocket compass) from the above mentioned chimney pile, Distance from seventy to eighty Feet, he observed another like pile of Stones and Brick,[3] to all appearance as the former, and bedded in like Manner with clayey mortar of same light or bluish colour—that had evidently the same appearance of a tumbled chimney —with Roots of Trees interwoven.—

3rd. That from this last mentioned pile of to appearance tumbled chimnies, in Direction (by his pocket compass) of about West by North, Distance seventy or eighty feet,[4] he observed another pile of Stones; which, in every particular, resembled the former.—

4th. From this last mentioned pile, he found another Heap of Stones in the Direction (from the preceeding) of South by West, Distance about thirty or forty feet[5]; for the pile covered so much Space as to render it difficult to measure the exact Distance: This Heap of Stones, &c., resembled in every particular the former, as described and, like them, evidently appeared the Result of a tumbled chimney.

5th. Everywhere they dug about the Island, they found nought else but a sandy hungry soil, above and beneath for the Depth of from three to six Feet—then Rock.—

6th. He observed a remarkable Ridge of Rocks, somewhat to the Southward of the above mentioned Foundations, and runing some distance athwart, or across the Island.—

7th. The Sea-Coast around the Island is very rocky—except at its South End (opposite a small Peninsula) where is a high sloping Sand Bluff, and some clay; in chaining from which, over a Shoal to the Ledges South thereof, he observed large Quantities of Muscles and some Clams—on a Bed of Sand—Clay—and Rocks.—

---

[1] Evidently the storehouse.

[2] De Monts's own house apparently. There is some difficulty in homologizing the distances and direction of the ruins given by Wright with the locations of the buildings on Champlain's plan (Fig. 9), but it is to be remembered that both are only approximate.

[3] Apparently the house T of Champlain's plan (Fig. 9).

[4] Apparently the house E of Champlain's plan.

[5] Apparently the dwelling of Champlain, P on the plan.

8th. In surveying around the Island, he did not observe the least Run, or any Springs, of fresh water; though the People with him made diligent Search for some to drink; but, they were obliged to send to the Main Land for some.

9th. In the Neighbourhood of the before mentioned Foundations and piles of (to Appearance tumbled chimnies, he observed several deep Holes that seemed to have been dug in Search of Water.

10th. And, further, this Deponent saith that, the Island is covered with Wood—some of considerable Size—The Species are chiefly of Fir—Spruce—some Pines—White Birch—Maple—Cedar and Beech—He saw but one Oak Tree:—that appeared to have been lately fallen with an axe, for some of its' Leaves were on the Branches:—It measured from eighteen to twenty Inches in Diameter, near the But.—

11th. And lastly, this Deponent saith that, a plan of the said Survey now in his hand intitled a plan of Isle de Sainte Croix, or Bone " Island situated in the Scoodiac or Great River "Sainte Croix, in Passamaquoddy Bay "—is a true plan of a Survey of the said Island made by Him, the said Deponent, on the Twelfth Day of October in the year of our Lord One Thousand seven hundred and Ninety-seven.—

St. Andrews Oct. 24th 1797.

THO. WRIGHT.
Surv. Genl.
of the Isl St. John.

St. Andrews, County of Charlotte,
Oct. 24th 1797.

Personally appeared the above named Thomas Wright, Esquire, and made Oath on the Holy Evangelists of Almighty God to the Truths of the aforegoing Deposition by him subscribed.—

Phineas Bruce, Esquire, was notified and present at the taking of this Deposition.—

Before us,
JNO. CURRY, J.P.
DANL. MCMASTER, J.P.

The map of Bone Island made by Thomas Wright is that herewith reproduced.[1] (figs. 11, 12.)

This testimony was transmitted to the commissioners, and accepted by them. Naturally the British agent rested his case with confidence upon it, while the American agent endeavoured to explain it away. The latter claimed that the ruins were not proven to be those of de Monts' settlement, but were much more likely those of

---

[1] Not hitherto published except in the author's work, "A Monograph of Historic Sites in the Province of New Brunswick," in these Transactions, Vol. V., 1899, Sect. ii., page 264. Two copies of the map are accessible, one in the Crown Land Office at Fredericton, from which the present copy (Fig. 11) is taken, and another with the Benson MS. in the Library of the Massachusetts Historical Society. Other copies are in the MS. Records of the Boundary Commission.

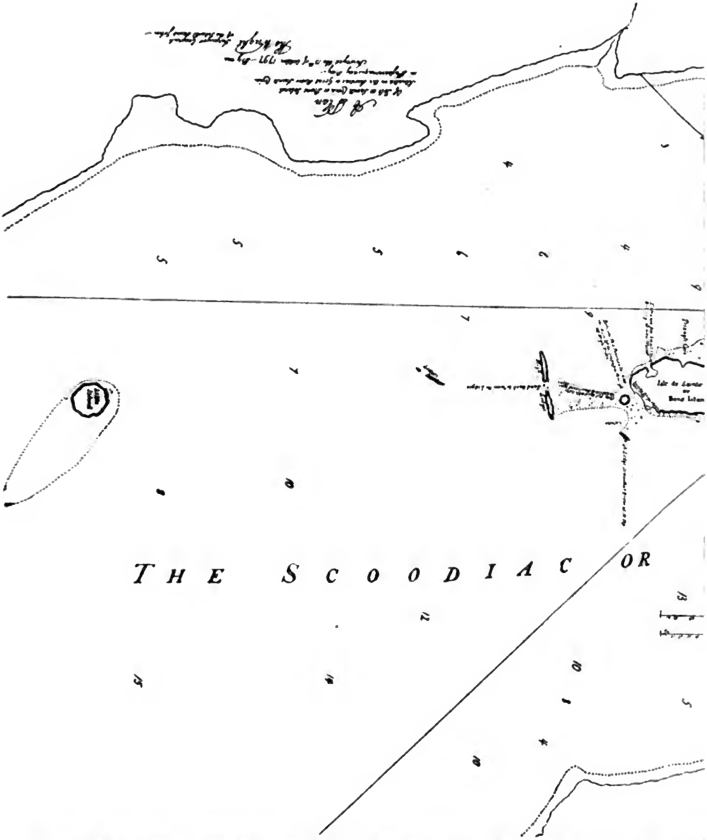


FIG. 11.—Wright's map of the Island and Surroundings, 1797. From the copy in the Cro
size. (For the sake of clearness in the reduced copy, the shore lines have been
larger than in the original.)

AND
G
v
n

some early trading post of Razilly or other early Seignior; and second, he maintained that in any case the subject was not important to the question at issue since it was not the St. Croix of de Monts and Champlain that was meant by the Treaty, but the St. Croix of the maps used by the negotiators of the Treaty of 1783, which St. Croix he held to be the Magaguadavic. The commissioners, however, unanimously agreed that the St. Croix of the Treaty could be traced back continuously to the St. Croix of de Monts and Champlain, and that the two were one and the same river. Hence Isle St. Croix proved the identity of the river.[1] Their opinion as to the value of the evidence contained in the above cited testimony can best be given in the words of the third commissioner, Egbert Benson, who, in a report[2] to the President of the United States, explaining the decision, says:—

> Subsequent to the View of the mouths of the Rivers in question, and the adjacent Objects, by the Commissioners, at the instance of the Agents, in the Fall of 1796, the Edition of *Champlain*, of 1613, was procured from Europe, containing a Map of the Isle *Sainte Croix*, a copy of which is hereunto annexed, and a Search having then been made by digging into the Soil on the Island called *Bone, or Docias*, Island, Bricks, charcoal, spikes and other artificial articles have been found, and evident foundations of buildings have been traced. Whoever will compare these proofs with the Bay of Passamaquady, including the Islands and Rivers in it, will perceive that they result in *demonstration* that the Island St. Croix, and the River Saint Croix, meant by them, are respectively Bone Island, and the River Scudiac, comprehending in the latter the arm of the Bay, or as it is expressed by Lescarbot, *Sea*. . . . .

Thus was the evidence as to the identity of the River St. Croix, based upon the discovery of the ruins of de Monts's settlement on St. Croix Island, together with the comparisons between the ancient and modern maps, accepted by the commissioners as final and unquestionable. On October 25, 1798, they rendered a unanimous decision in which they declared the Scoodic, or present St. Croix, to be the River St. Croix truly intended by the Treaty of 1783, and it thus became the International Boundary as we know it to-day.

Such was the part played by Dochet Island in the Boundary controversy. It is too much to say that upon it alone depended the identification of the river and hence its selection as the boundary, for there was probably enough other evidence to have produced the some result. But, on the other hand, it is very probable, since one of the commissioners is known to have held at first strongly for the Magaguadavic, that without the evidence drawn from the island, the commissioners would have been divided in opinion instead of unanimous. In this case their decision would have been received with reserved acquiescence and some feeling of injustice, rather than with general approbation and satisfaction as it was. Dochet Island, therefore, has contributed somewhat to the peace between nations. It is only occasionally, and in the writings of the most partizan and uninformed writers, that we find the view still expressed that the Magaguadavic should have been the boundary. Happily, the sole remaining support for this view, namely, that the River St. Croix on Mitchell's map used by the negotiators of the Treaty was the Magaguadavic, has by recent studies been shown to be erroneous, and, even the River St. Croix of that map has been proven to be the present River St. Croix. Thus from every point of view, the decision of the Commission of 1798 was perfectly just, and both nations may feel entirely satisfied with the result.

---

[1] It is no wonder that Chipman in one of his letters (of Mar. 27, 1798) to Jonathan Odell (MS. in possession of the author) speaks affectionately of "My little Isle St. Croix." With its identity established he easily won his case: without it this would have been difficult enough.

[2] The Report is printed in full in Moore's "History and Digest of the International Arbitrations to which the United States has been a Party," Vol. I., 33-43, and reference is there made (page 32) to other publications of it.

We come now to the final incident in the history of the island in this period, and that concerns its ownership by the United States. The decision of the Commission fixing the St. Croix as the International Boundary, also declared its mouth to be at Joe's Point, although, as we have already seen (page 128), the true geographical mouth of the river is at Devil's Head. The reason for this decision of the commissioners is nowhere recorded, but it can be inferred from the attendant circumstances, and is implied in Benson's report on the decision, namely, it was thought best to conform to the historical usage of Champlain, making the River St. Croix include the waters around Isle St. Croix from which it took its name and by the aid of which it had been identified. Along with this, too, there was no doubt, another reason, namely, that in the Treaty of 1783 the mouth of the St. Croix was described as in the Bay of Fundy; it was no doubt felt that while Passamaquoddy Bay could be readily considered as a part of the Bay of Fundy, the part of the river between Devil's Head and Joe's Point could hardly be so viewed, and that hence a better accordance with the language of the Treaty would be secured by placing the mouth of the river officially at Joe's Point. This decision, however, had an extremely far-reaching effect upon the subsequent history of Dochet Island, for, incidentally, it assigned the island to the United States, whereas, had the commission fixed the mouth of the river at the Devil's Head, the island would to-day be a British possession. The reason why this is so may be briefly traced. The decision of the Commissioners said nothing directly about the islands in the St. Croix, but the Treaty of 1783 had declared the boundary to be a line drawn "along the middle of the River St. Croix," and the middle line of the St. Croix lies on the east side of the island (fig. 4, also 10), hence throwing the island into the United States. On the other hand, if the decision had placed the mouth of the river at Devil's Head, then the part below, in which the island lies, would have been a part of the Bay of Fundy, since the Treaty declared the mouth of the river to be in the Bay of Fundy and recognized no other waters. But the Treaty assigned to the United States all islands within twenty leagues of its coasts lying between lines drawn due east from the mouth of the St. Croix and the mouth of St. Mary's River in Florida, "excepting such islands as now are, or heretofore have been, within the limits of the said Province of Nova Scotia." Now, the old charters of Nova Scotia, on which her ownership was based, had granted to her all islands within six leagues of her coasts, and this is the reason why New Brunswick, the legal successor here of Nova Scotia, possesses to-day all the islands of Passamaquoddy Bay, except only Moose Island and two contiguous islets, which were in 1817 assigned to the United States chiefly on the ground of her long possession of them and in return for a partial claim she had to Grand Manan. Had the mouth of the St. Croix been fixed at Devil's Head, Dochet Island would have been in the Bay of Fundy, and, being within six leagues of the coast of New Brunswick, would to-day belong to that province.

But, although it thus fell plainly to the United States, it was not yielded without some symptoms of protest. In a manuscript draft of a letter of Ward Chipman, the British agent before the Boundary Commission, to Governor Carleton, dated July 7, 1799, we read as follows (Ms. in possession of Rev. Dr. Raymond): —

> I take this opportunity further to inform your Excellency that I have received intelligence that the subjects of the United States residing on the western shores of the River St. Croix have lately taken possession of the Isle St. Croix lying in this river just within its mouth, and from which the river originally took its name. Under the construction of the 2d article of the Treaty of Peace, which I had the honour to submit to your Excellency's consideration in my letter of the 21st ulto. your Excellency will perceive that this island belongs to the United States as lying on the west side of the channel and of the dividing line between the two countries along the middle of the river from its mouth, and to the northward of a due East line from its mouth, and not therefore affected by the clauses affecting islands in this article of the treaty; but if this construction is erroneous, and the exception or reservation to His Majesty of such islands as have at any time been within the limits of the Province of Nova Scotia is to be considered as absolute and unqualified, and the clause descriptive of the Islands granted to the United States is to have no effect whatever upon the exception, this island still undoubtedly belongs to his Majesty as having been at the time of the treaty of peace within those limits.

Governor Carleton transmits, the subject, somewhat perfunctorily, to the Duke of Portland in a letter of August 5, 1799, suggesting that Great Britain may still have a claim on Isle St. Croix through the general exception of islands belonging to Nova Scotia. But Chipman himself saw the subject differently soon after, for in a draft of a letter of his (Ms. in the author's possession) to Sir John Wentworth, Governor of Nova Scotia, of August 6, 1799, he says:—

> . . . . This island [Isle St. Croix] tho of very trifling value, has been during the present year taken possession of by Subjects of the United States residing upon that part of the western shore of the River St. Croix which is opposite to it—altho' this island was clearly included in the original Grant of the Province of Nova Scotia to Sir William Alexander and therefore was an island which "had formerly been within the limits of that Province," still I conceive that it is not saved to His Majesty by virtue of the exception in the 2d article of the Treaty of Peace, because it is not found to lie between the due east lines mentioned in that article, and therefore is not included in the Grant of the Islands upon which alone the exception can operate. The right to this island I conceive must be decided by ascertaining whether it lies on the American side of the boundary line mentioned in the Treaty of Peace "to be drawn along the middle of the river St. Croix from its mouth in the Bay of Fundy to its source," and as this island does in fact lie on the American side of such line along the middle of the river,[1] and also on the western side of the main channel of the river, and to the northward of a due east line from its mouth, if my construction of the treaty in this respect is not erroneous, it evidently belongs to the United States. . . . .[2]

Chipman's later position seems unquestionably the correct one, and with this the subject ends. However much we may regret that this island does not belong to the country with whose history it is so closely connected, we must all agree that the title of the United States to it is perfectly clear and just.

Curiously enough there is an apparent still later British claim to the island, no longer ago than 1896, for in that year in a codification of the boundaries of New Brunswick passed by the local legislature, Doucetts Island is included within the bounds of the Parish of St. Croix in Charlotte County. This was, of course, due to some error on the part of the compilers of the Act, but it is curious that there was no one in the Legislature of New Brunswick sufficiently informed to point out the error before the Act was passed. But, in 1899 a new law was enacted to strike out the words "Doucetts Island in the River St. Croix" from the description of the bounds of St. Croix.

---

[1] It is fortunate that the island lies on the west of the middle of the river, as well as on the west of the deepest channel, or a controversy might have arisen over the exact significance of the word "middle" of the Treaty.

[2] At one time he thought the boundary line would run through the island, for in a letter of Mar. 27, 1798, (MS. in my possession) he writes to Jonathan Odell,—"My little Isle St. Croix will probably be divided between the two countries."

3. THE MODERN HISTORY OF DOCHET ISLAND FROM THE FIRST PERMANENT SETTLEMENT OF THE RIVER TO THE PRESENT,—1799—1902.

The modern history of the island began apparently with the adoption of its present name not long prior to 1796. The permanent settlement of the Passamaquoddy region had begun in 1763 with a few New England fishermen and traders, and a few settlers from various sources continued to arrive from time to time until 1784, when large numbers of loyalists settled on the British side of the St. Croix, and various settlers began to occupy the American side. But there is nothing to indicate any occupancy of Dochet Island prior to 1799, and probably it was not settled, for had any settlement existed it would hardly have escaped mention in the testimony of Pagan and of Wright above cited, or some representation on Wright's map. Moreover, the implication in the letter of Ward Chipman above cited, is that American settlers were taking possession of the island for the first time in 1799.

There is no evidence known to me as to who these settlers were aside from tradition, which states that the earliest settlers on the island were one Haliker and his wife, who lived there many years, and whose graves, marked by rude unlettered stones, can now be seen near the lighthouse. It is possible, however, that Haliker and his wife were simply early residents, and not the earliest. The first residents must have been squatters, since the island was not granted until 1820. The next event in the history of the island is also supplied by tradition, namely, that at the time of the war of 1812 the island was used as a "neutral island" (hence originating the name, Neutral Island, by which it has often been known), on which the British and American vessels exchanged their cargoes of plaster. For some years prior to 1812, and for some time after, the navigation laws of one or the other nation were so constructed that British vessels could not carry plaster or other goods into the United States, nor United States vessels go to British ports for it. Consequently, the vessels had to meet and exchange cargoes, quite illegally, on certain places tacitly accepted as "neutral," and Dochet Island was one of these places, probably utilized for this purpose because far removed from the customs officers who had headquarters at Eastport.[1] British vessels are said to have unloaded the plaster upon a wharf, traces of which are still to be seen, built for the purpose in Treats cove (Fig. 14), whence it was taken by American vessels. Tradition states that during the war time a settler named Herrick, possibly the Haliker above mentioned, lived on the island.

---

[1] A good account of these operations has been published by Sabine, reprinted in Kilby's "Eastport and Passamaquoddy."

Soon after this time we come to authentic information. On March 1, 1820, the Commissioners of the District of Maine in the Commonwealth of Massachusetts, sold to John Brewer, of Robbinston, in return for thirty dollars

> "two small islands in the Bay of Passamaquoddy, one situated nearly opposite the dividing line between the Towns of Robbinston and Calais containing four acres more or less and commonly called the great Island; and the other containing one acre more or less lying about one mile southerly from the first mentioned Island and near to the shore of Robbinston and called the little Island.[1] *(Washington County, Registry of Deeds, Machias, Me., Vol. 11, page 337.)*

Great Island is, of course, our Dochet. John Brewer was a prominent citizen of Robbinston, and I believe was the magistrate who took several depositions for the Boundary Commissioners. He was on the island with Pagan, July 11, 1797,[2] and, as one of those concerned in the discoveries on the island, it is very likely that at this time his attention was called to it, and he took the first opportunity thereafter to secure a grant of it. He did not, however, long retain it, for, on August 15, 1826

> John Brewer of Robbinston, in consideration of six hundred dollars paid by Stephen Brewer of Northampton, Mass., Gentleman . . . . remise release bargain sell and convey . . . . an Island commonly called St. Croix Island lying in Schoodick River nearly opposite the south east corner of Calais, together with the house barn and all other buildings thereon, and also the wharf and all other improvements on or about said island. *(Washington County Deeds, Vol. 17, page 11.)*

The house and other buildings were doubtless those occupied by Haliker as tenant of Brewer, and the wharf was the plaster wharf above mentioned. Why Stephen Brewer, presumably the brother of John, a prominent merchant of Northampton, Massachusetts, purchased this island we have no idea, nor can his daughters still living in Northampton explain; but it is of interest to note that he owned other parcels of land on the mainland in this region.

---

[1] I have not followed the ownership of Little Dochet beyond this date. Probably it still belongs to the heirs of John Brewer. It appears to be valueless. I am informed by Dr. Howard Vose, of Calais, that the diary of Richard V. Hayden, a noted surveyor of this region, contains the following entry, April 17, 1823:—"Surveyed Big Island for Gen.'l Brewer . . . . contents about 6 acres." Of course he would have made a map, which would be of great interest if it could be found.

[2] See earlier, page 201.

We now come to some information, which, although resting upon tradition alone, is yet reliable since it comes within the memory of a still living witness. There is now (September, 1902) living at Red Beach, Maine, Mr. George Mingo, over 80 years of age but in possession of all his faculties, who, in early boyhood lived with his parents upon the island, and has known it intimately ever since. From him I have derived much information about the recent history of the island. The earliest owner he remembers was Stephen Brewer, and hence he must have lived there between 1826 and 1830. There were at that time on the island four buildings, standing where the old cellars [1] now are, at the south-western angle (Fig. 14), all occupied or used by his family. There was much cleared land and many signs of earlier settlement in fruit trees and bushes. The ruins of the old French settlement were clearly visible as was the place on the bluff where cannon had been placed. The Chapel Nubble was then united with the main island and a large pine tree stood upon it. Every summer there came to the island from the Penobscot River, four fishermen, named Black, Treat, Noble and Sanburn, who lived with the Mingo family and tended the six salmon weirs of which they had charge and from which many fish were taken. There were stages for the curing of fish here also, and, in fact, although the residents of the island did some gardening, fishing was the chief interest which took them to the island. Somewhere after 1830, perhaps considerably later, the Mingo family removed from the island. It is doubtless to this family Williamson refers in 1839 in his History of Maine (Vol. I., 189), when he says of the island, "Its soil is fertile, and it is usually the residence of one family." After the Mingo family left it, there was for a time a resident named Treat, and later another named Chase. Later, one Thompson kept there a sort of public house of low repute, to which people resorted from Calais and elsewhere. These two latter residents gradually burnt up the older buildings for wood; they remained but a year or two, and then there were no more residents on the island until the lighthouse was built. For some time after this, however, the residents of the mainland used to remove from the island scow-loads of sand for building purposes, and this has contributed to the diminution in size of the lower end of the island and the separation of the smaller nubble from the main island. In 1847, or thereabouts, Admiral Owen used the island as a station in making his survey of this region for the British Admiralty, the survey on which our present charts are based. He cut down many of the trees on the island to open lines of sight for his instruments, doing much to destroy the fine woods which Mr. Mingo remembers to have occupied most of the island in his early boyhood.

---

[1] There are some other cellars on the island (Fig. 14), that south of the lighthouse probably belonging to Haliker's house. Other hollows on the island have a different origin, that north-east of the lighthouse being a pit from which sand was taken in erecting the buildings, and others being holes dug by money-hunters who have left such traces in most of the prominent places in this region.

We come now to a new and important chapter in the history of the island. On June 4, 1856, the heirs of Stephen Brewer of Northampton, Massachusetts, sold to the United States of America, for the sum of one hundred and thirty-three dollars and thirty-three cents

> a certain Messuage situated on Neutral or St. Croix Island, so called, in the St. Croix River opposite the Plaster Mills at Red Beach in Calais. . . . . Two undivided third parts of the northerly half of the Island aforesaid, beginning on the westerly shore of said island at a rock marked with a cross at high water mark, thence running south sixty-three degrees east[1] across the said island to the eastern shore of the same where there is a marked stake at high water mark, thence northerly westerly and southerly by the shore of said island to the place of beginning, containing two and a half acres of upland, more or less, with the beach and flats pertaining to the said northern half, meaning to convey to the said United States two undivided third parts of the above described premises. . . . .[2]
>
> (*Washington County Deeds, Vol. 86, page 27.*)

Thus, the larger part of the island passed into the possession of the United States, by whom it was bought for the erection of a light station. This station was established the next year (1857). The full records of the station are, of course, preserved in the archives of the Lighthouse Board at Washington, and through the courtesy of the Engineer-Secretary in charge I am enabled to cite the following facts. The first keeper was Elias Barber (December 15, 1856—August, 1859). The light was discontinued August 1, 1859,[3] and re-established in October, 1869, since which time the keepers have been,— Jacob F. Young (November 10, 1869 — December 17, 1875), Harrison Keen (January 11, 1876—April 28, 1880), and Joseph Huckins, appointed May 4, 1880, and now in charge, an efficient and popular official. The lantern carrying a white light flashing every thirty seconds is built upon the keeper's house, and is 74 feet above the sea. Long may it shine for the guidance of good mariners!

---

[1] The position of the mark is not known exactly, nor is the line marked.

[2] The British Chart of 1827, and some other maps, mark a lighthouse on the American shore below Dochet Island, and I supposed the Dochet light was established to replace it, but I am informed by the U. S. Lighthouse Board that this was not the case. I know nothing of the shore station. Among the papers cited by the Lighthouse Board is a letter of 1853 from a captain who says "A lighthouse upon this [Big, viz., Dochet] Island is very necessary as the many vessels wrecked upon it abundantly prove." I have no information about these wrecks.

[3] An interesting reference to the Island at this time is given by Willis in the New England Historical and Genealogical Register, Vol. XV., 1861, p. 212: "This island is now called Neutral Island. . . . . It has a lighthouse upon it, with a house for the keeper: is well covered with grass, and has some old fruit trees, apple and cherry, upon it. I took from it, in the summer of 1860, some pieces of French bricks, of which there are many fragments remain-

Not long after the erection of the lighthouse an attempt was made to re-name the island. The only account of the ceremony known to me is contained in a footnote in Godfrey's "Centennial Celebration of the Settlement of Bangor," Bangor, 1870, page 20, which reads as follows:

> This has been called Neutral Island, and Dosquet's Island. The "Congressional Voyagers" in the U.S. Cutter Mahoning, along the coast of Maine, in 1866, having with them Mr. Hilgard, of the U. S. Coast Survey, and several gentlemen of the Maine Historical Society, voted that the island be hereafter called Demont's Island, at the same time giving the proper salute.

The history of this abortive name has been mentioned earlier in this paper (page 145).

The sale of a part of the island to the United States in 1856 left the remainder still in possession of the heirs of Stephen Brewer. On May 5, 1869, however, they

> in consideration of one hundred dollars paid by Charles H. Newton, Joseph A. Lee, Herbert Barnard and Benj. F. Kelley . . . . remise release and forever quit claim . . . . the southerly part of Big Island so called in St. Croix River, beginning at a mark (x) in the ledge in a small cove on the westerly side of the island near highwater mark thence running S. 63°E about 22 rods across the island to a marked birch tree on the easterly bank or shore of the island, thence following the shore southerly westerly and northerly around the southerly part of the Island to the mark in the ledge . . . . containing three acres of upland more or less with the beach and flats pertaining to the same—meaning to convey all that part of Big Island so called not heretofore conveyed to the United States of America to the said Newton etc. (*Washington County Deeds, Vol. 122, page 162.*)

In the possession of these purchasers, or of their heirs, the property now stands. It is well known locally that their object in acquiring the island was to make of it a summer resort, but nothing was done toward this end beyond stopping the injury done it by the removal of sand. In this unimproved condition it remains at this day, a pasture for the light-keeper's cow, and a picnic ground for all who care to use it.

---

ing." I may add that visitors still (1902) take away fragments of "French brick" to such an extent, as the lightkeeper informs me, that he cannot keep brick on the island to repair his chimneys !

We have but one more event in the island's history to record. In 1885, during the careful survey of this region made by the United States Coast and Geodetic Survey, the island and its surroundings were carefully surveyed, and the resultant map of the island, reproduced by the kind permission of the Director of the Survey, is given herewith (Fig. 13). As earlier explained (page 146), the origin of the name Hunt's Island applied to it is not known, nor has the name persisted.

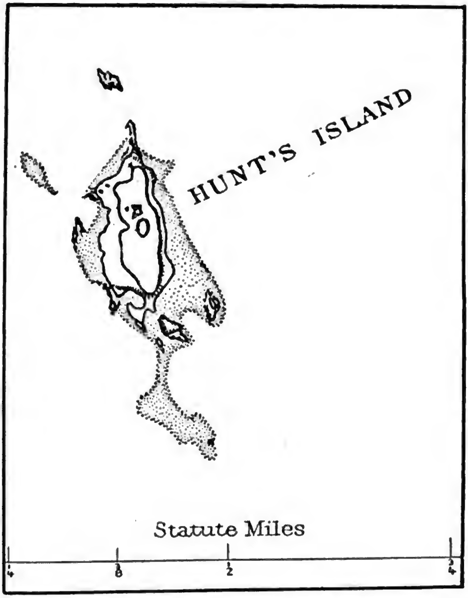


FIG. 13.—The United States Coast and Geodetic Survey map of the Island, 1885. From the original MS. sheet in the Archives of the Survey; original size. From this the map of Fig. 4 was constructed.

The present condition of the island is represented in large part upon the accompanying map (Fig. 14), and more fully by the accompanying photographs (Figs. 15-24), all of which were taken by the author in September, 1902, except No. 15, which was taken a few years ago.

Such is the history of Dochet Island, and its state at the present day.

4. THE FUTURE TO BE DESIRED FOR DOCHET ISLAND.

The future of the part of the island owned by the United States is assured; it will remain perpetually the property of the government, and continue to support the light station, which is here both indispensable and admirably placed. For the remainder, however, still in private hands, there are two possible futures, aside of course, from remaining in its present condition, which cannot continue indefinitely. First, it will be bought by some person of means who will build there a summer home, and then it will cease to be open to all as now, and the public will have a right to visit this part of the historic island only by courtesy of the owner. Indeed, an attempt has already been made, but so far unsuccessfully, by a prominent former officer of the United States Government to secure it for such a purpose. Second, it could be purchased by the State of Maine as a part of a park system ultimately intended to preserve for the free use, enjoyment and instruction of the public, all places of great historic, scenic or other unusual interest in the State. Certainly it would be a misfortune if even a part of the island in whose history so many feel a deep interest, and which, by that very fact, becomes in a measure the property of all, should be closed against the free access of all who desire to visit it. It is a good thing for a people to take pride in their history, and this they do the more if they can study it freely upon the actual sites of their historic events, and surrounded by the charm which always hovers over places which have witnessed historic scenes. It would be an enlightened and public-spirited, and as well a profitable, act for the State of Maine to take over and care for this place as a contribution to the higher life and to the education of the people of the State, of the Union, of America. At no large expense it could be acquired, beautified by the planting of trees, and preserved against farther loss from the waves, and an understanding could no doubt be effected with the United States Government for the improvement of the entire island. The Maine Historical Society would be its natural custodian or guardian, and could most properly initiate this movement. Further than this, there should be erected upon the island a suitable monument stating the chief facts in its history and indicating the principal historic spots upon it. This, indeed, need not wait for the consummation of the larger plan, but could well be undertaken by the Maine and New Brunswick Historical Societies jointly. And there could be no more appropriate time for its dedication than the ter-centennial of the discovery of the island on June 26, 1904.

It would be a marked day in the history of Maine and New Brunswick, if, on that three hundredth anniversary of the discovery of the island, the representatives of the two historical societies and the people of the river could meet upon the island, and, with dignified and appropriate ceremonies, dedicate at one and the same time the island tc the free use of the people forever, and a graceful monument recording the events and commemorating the persons prominent in its history. May the wish prove a prophecy !

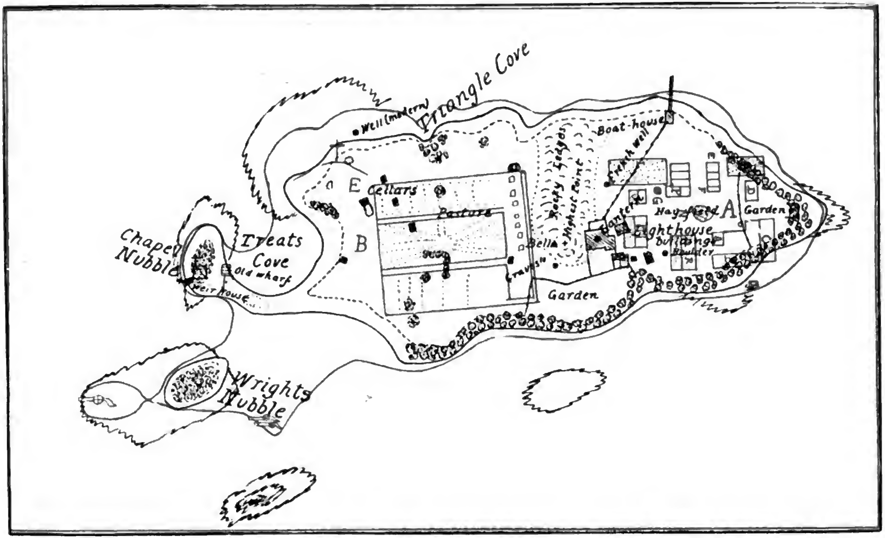


FIG. 14.—Map of Dochet Island showing its present condition (in black), in comparison with its approximate features in the time of de Monts and Champlain (in red). The lettering on the red map corresponds with that on Champlain's maps (Figs. 8 and 9).

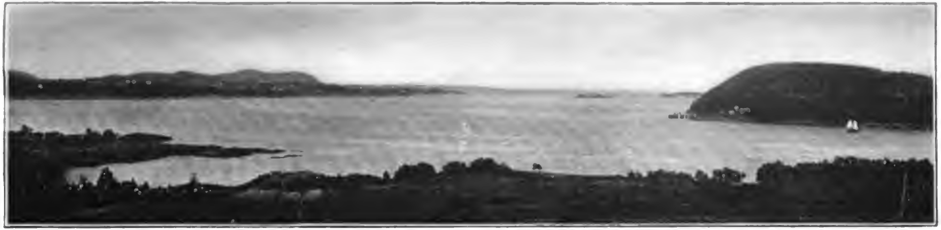


Fig. 15—Distant view of Dochet Island looking down the river from near Oak Point. Beyond, on the right, may be seen Little Dochet and the American shore, while nearer is the Devils Head (with Hotel de Monts) and the river leading up to Calais and St. Stephen. On the left is the Canadian shore with Chamcook and Greenlaw in the distance, and, nearer, the entrance to Oak Bay. (Taken in 1898 or 1899.)

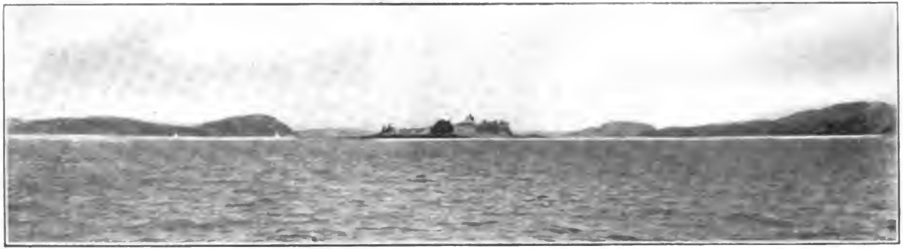


Fig 16.—Nearer view of the Island, looking up the river. The westerly slope of the island is plain, and Wright's Nubble is conspicuous in the centre. On the left is the American shore, with the prominent Devils Head; on the right is the Canadian shore with McLauchlan's Mountain nearest, and Leighton's Mountain, on the right of which lies the Waweig, in the distance.

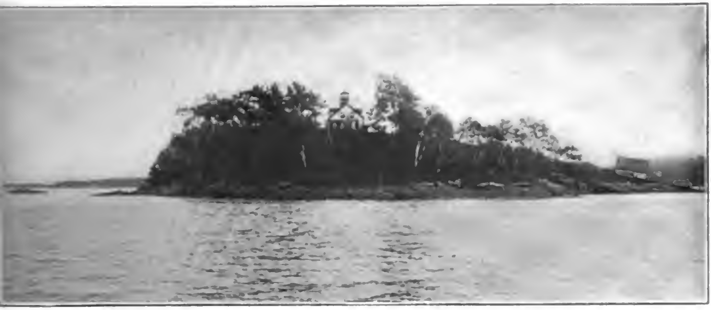


FIG. 17.—View of the Island from the north, at high tide, showing its westerly slope. The Light-station is in the centre, and the boathouse on the right. The settlement of de Monts was between the Light-station and the bank in the foreground.

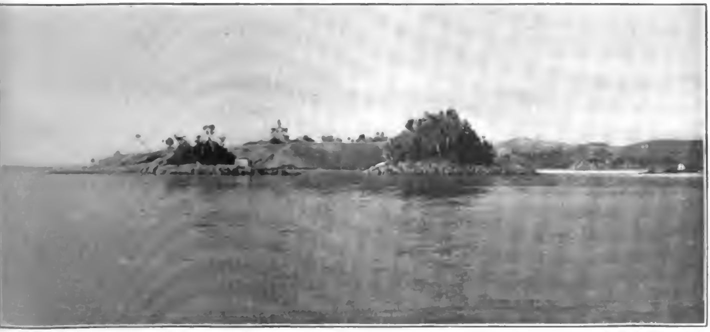


FIG. 18.—View of the Island from the south, showing the Light-station, the sandy bluffs forming the southern end of the main island, and the two nubbles, the Chapel Nubble, with the weir-house, on the left, and Wright's Nubble on the right. The gardens of de Monts were between the Light-station and the sandy bluffs.

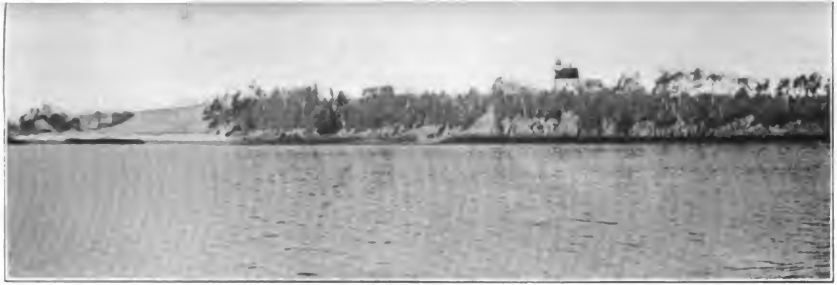


FIG. 19.—View of the Island from the east, at half tide, wanting, however, the northern end. De Monts' settlement was to the right of the Light-station, and the gardens to the left. At the extreme left is the sandy bluff and the Chapel Nubble.

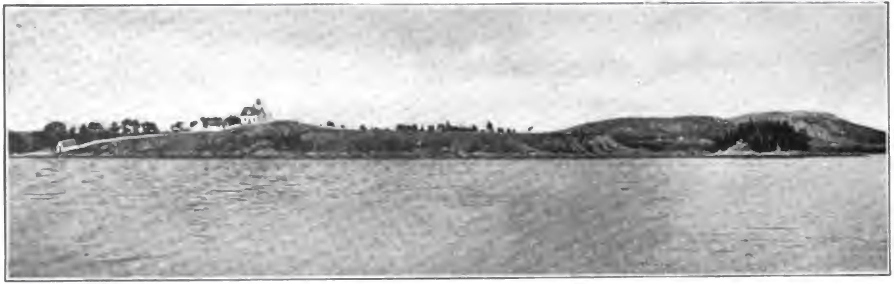


FIG. 20.—View of the Island from the west (southwest), above half tide, De Monts' settlement stood to the left of the Light-station, which is on a ridge of rock, and the gardens were on the level land on its right. Farther to the right may be seen the sandy bluffs, and the two nubbles (overlapping one another), while beyond these rises the Greenlaw-Chamcook mountain.

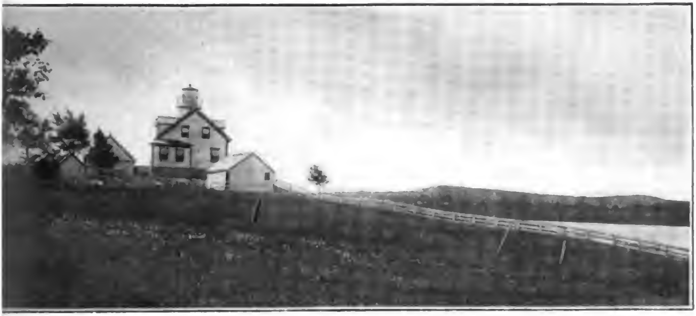


FIG. 21.—View from the extreme northern end of the Island looking south to the Light-station across the site of the settlement of de Monts, which covered the grassy field in the foreground. Beyond is the American shore.

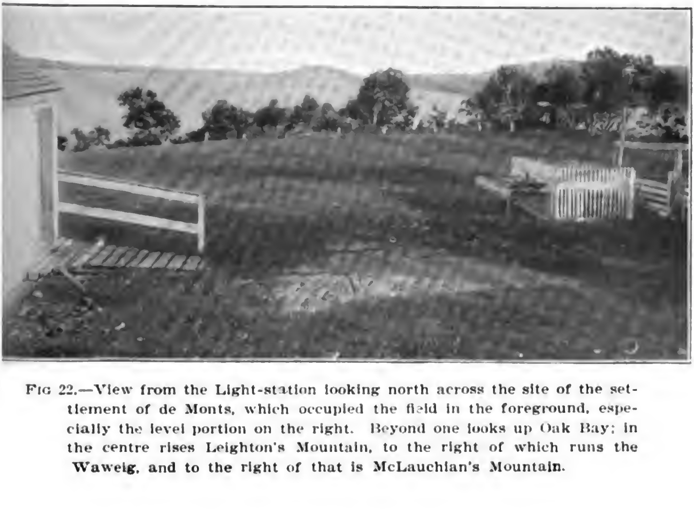


FIG 22.—View from the Light-station looking north across the site of the settlement of de Monts, which occupied the field in the foreground, especially the level portion on the right. Beyond one looks up Oak Bay; in the centre rises Leighton's Mountain, to the right of which runs the Waweig, and to the right of that is McLauchlan's Mountain.

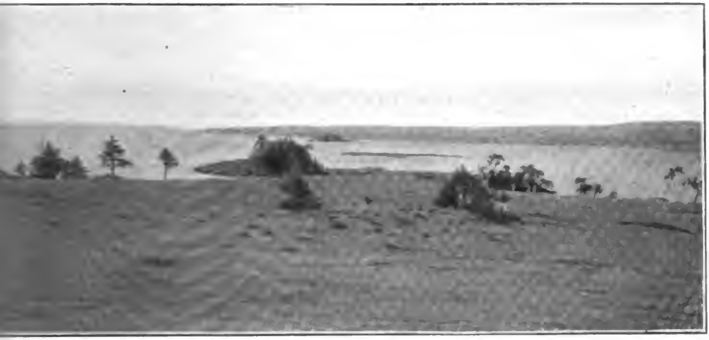


FIG. 23.—View from the Light-station southward across the site of the gardens of de Monts, now a pasture. In the distance lies Little Dochet, with the American shore beyond; nearer is seen Wright's Nubble, and on the right the group of trees crowning the Chapel Nubble. On the extreme right, the two trees mark the edge of the hill on which the cemetery was placed in 1604, now almost entirely washed away.

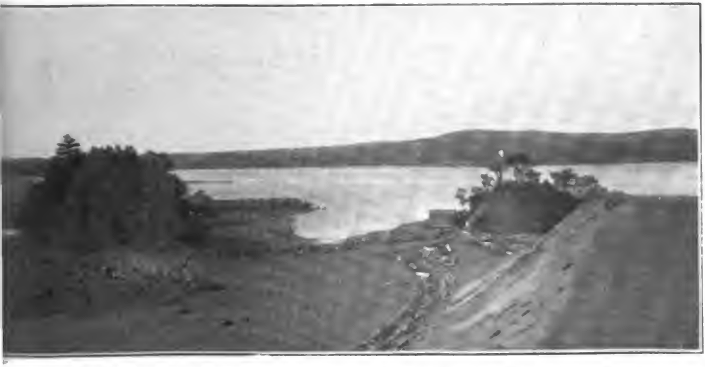


FIG. 24.—View from the southeast angle of the Island, looking southwest. Wright's Nubble on its rocky ledge is on the left, and beyond it are the extensive ledges visible at low tide; on the right are the sandy bluffs, and beyond is the Chapel Nubble, with the weir house. In the distance is the American shore.

VII.—*A Canadian Bibliography of the Year 1901.*

BY MR. LAWRENCE J. BURPEE.

(Read May 27, 1902.)

The preparation of the following bibliography was undertaken at the request of the late Honorary Secretary of the Royal Society. Sir John Bourinot had for several years advocated the compiling of an annual Canadian Bibliography, to be published in the Transactions of the Royal Society, which would cover everything of importance by Canadian writers, bearing upon subjects included in the English Literature section of the Society. He had had some thoughts of attempting such a bibliography himself—and his admirable bibliography of the Royal Society proved his special fitness for the present task—but the pressure of other engagements made it impossible. No other member of the Royal Society seemed prepared to undertake the bibliography, and Sir John Bourinot, knowing that I had had some little experience in work of this nature, asked me to attempt it.

I had several opportunities of discussing the plan and scope of the proposed work with Sir John Bourinot, and we finally decided to include, not only books, but, as far as they could be identified, pamphlets, papers in society transactions, and magazine articles. In the latter class have been included quarterly, monthly and weekly periodicals — everything, in fact, except newspapers. Of course, the list has not been confined to Canadian periodicals, but includes, as well, Canadian work in English and American magazines. The contents of Canadian college magazines have also been embodied in the bibliography. The list is confined to books, articles, etc., in English, but the original intention to restrict it to subjects covered by the English Literature section of the Society was not found altogether feasible, as it was sometimes difficult to define exactly what did and what did not belong to that section. I have consequently included, not only material in history, biography, fiction, poetry, archæology, and other subjects coming within the boundaries of the English Literature section, but also considerable matter belonging to the Scientific sections. Although these sections have, of recent years, been fairly well covered by special bibliographies, it did not seem desirable to exclude anything that might serve to supplement the material they contained. At the same time, the bibliography does not profess to be anything like exhaustive, so far as purely scientific publications are concerned.

I am indebted to many friends throughout Canada, and abroad, for assistance in gathering data; and would especially like to acknowledge the very complete list furnished by Mr. Arnold Haultain, of the writings of Dr. Goldwin Smith. The librarians of the several Canadian colleges have also been most courteous and helpful. No pains have been spared to make the bibliography as complete as possible, both as to the books and articles included, and the data descriptive of each. Not only has every available source of information been personally examined, but, where books or periodicals were not accessible here, data has been secured from the publishers, or from the custodians of public libraries. Notices, asking for data as to privately printed books and books printed abroad, were published in the literary weeklies of London, New York, Boston and Chicago, as well as in newspapers in all the leading Canadian cities. Finally, to gather up as much as possible of the residue, direct correspondence was had with many Canadian authors, of whose work I felt that I still had insufficient data. This involved the writing of several hundred letters. Having exhausted every possible avenue of information, I am still only too conscious that the bibliography will show many omissions and many inaccuracies. For these, in view of the difficulty of covering, in anything like an exhaustive manner, such a wide and varied field, one may perhaps claim at least a measure of indulgence. This bibliography cannot be more disappointing to others than it is to the compiler. In attempting such a task one is forcibly reminded of the warning of a veteran bibliographer: "If you are troubled with a conceit of accuracy, and would have it completely taken out of you, prepare a bibliography."

In addition to the bibliography proper, there will be found an Index of brief Titles, which may prove of service to those seeking material on a given topic, rather than the work of a particular author. Poetry will be found in a section by itself.

It is, of course, patent that the value and usefulness of such a bibliography as the present depends very largely upon its being continued from year to year; but one man can hardly be expected to give the time demanded by a task of this magnitude; nor in any event can one man do it justice. If I may be permitted to make a suggestion, it is that, in the event of this Canadian Bibliography being continued from year to year, the work should be divided among a number of men, each having a special knowledge of the subject entrusted to him. One might collect the year's publications in botany, another gather the work in history, a third deal with geology, a fourth with fiction, and so on, both in English and French, through the entire range of subjects. The material might then be handed to a general editor, thoroughly conversant with bibliography and modern cataloguing rules, who could put it into uniform shape, arrange it in proper order, bring the data into harmony with the most approved practice, and prepare a full index of titles, with cross-references, subject headings, etc. In this way, a bibliography would be prepared, year by year, covering the whole field of human knowledge, so far as Canadian work is concerned; a bibliography which would be of genuine service to students both at home and abroad, and alike creditable to Canada and the Royal Society.

A., E. D.
To my lassie (verse).
Canadian Magazine, Toronto, XVI, 520.

ABBOTT, ALBERT H.
Some photographic reminiscences.
Acta Victoriana, Victoria University, Toronto, XXV, 147.

ADAM, G. MERCER.
Walter Savage Landor, 1775—1864.
Canadian Magazine, Toronto, XVIII, 128.

ADAMS, REV. HENRY F., M.A.
C. H. Spurgeon—An analysis of the great preacher's power.
Acadia Athenæum, Acadia College, Wolfville, N.S., XXVIII, 11, 66.

ADAMS REV. W. H.
The English Nile.
Methodist Magazine and Review, Toronto, LIII, 337.

ADAMS, REV. W. H.
The Markham Memnonites.
Methodist Magazine and Review, Toronto, LIV, 395.

ADDISON, MARGARET E. T.
Glimpses of education in Europe.
Acta Victoriana, Victoria University, Toronto, XXIV, 301.

AHEARN, MRS. M. H.
The early settlers of March township.
Women's Canadian Historical Society of Ottawa, Transactions, I, 48.

AHEARN, MRS. M. H.
Historical Sketch of the 100th Prince of Wales' Royal Canadian Regiment.
Women's Canadian Historical Society of Ottawa, Transactions, I, 77.

AHEARN, MRS. M. H.
Settlers of March township.
Ontario Historical Society, Toronto, Papers and Records, III, 97.

ALEXANDER, C. J.
The woollen industry.
Industrial Canada, Toronto (Convention number), Vol. II, No. 4, p. 128.

ALEXANDER, W. J., Ph.D.
A school anthology of English poetry. Edited with an introduction and notes by W. J. Alexander, Ph.D., University College, Toronto.
Toronto, *The Copp Clark Co.*, 8vo., 1901.

ALEXANDER, W. J., Ph.D.
Scott's "Lay of the Last Minstrel." Edited with introduction and notes by W. J. Alexander, Ph.D.
Toronto, *The Copp Clark Co.*, 8vo., 1901.

ALLAN, REV. J. M.
His first day in class. (Prof. Charles Macdonald.)
Dalhousie Gazette, Dalhousie University, Halifax, XXXIII, 297.

ALLEN, A. W.
November (verse).
Acta Victoriana, Victoria University, Toronto, XXV, 60.

ALLEN, GRANT.
Colin Clout's Calendar (New Ed.).
E. P. Dutton, New York, 12mo., 1901.

ALLEN, GRANT.
Country and Town in England. London, Eng., 1901.
(A book of nature sketches.)

ALLEN, GRANT.
Gilbert White's "Natural History of Selborne," edited with notes by Grant Allen, and illustrated by Edmund H. New.
London and New York, *John Lane*, 1901.

ALLEN, GRANT.
The Backslider, London, Eng., 1901.
(A collection of short stories, published after his death.)

ALLEN, T. J.
Lumbering in New Brunswick.
The University Monthly, University of New Brunswick, Fredericton, N.B., XXI, 31.

ALLEN, T. J.
Mineral Resources of Albert County.
The University Monthly, University of New Brunswick, Fredericton, N.B., XX, 157.

ALLIN, ARTHUR.
Work and Discipline.
Acta Victoriana, Victoria University, Toronto, XXIV, 339.

ALLISON, WILLIAM TALBOT.
The Intendant Talon's farewell to New France. (Verse.)
Acta Victoriana, Victoria University, Toronto, XXV, 141.

ALLOWAY, MARY W.
Looking Backward.
Rod & Gun in Canada, Montreal, II, 421.

ALWARD, SILAS.
My descent into Hades.
Acadia Athenæum, Acadia College, Wolfville, N.S., XXVIII, 182.

AMI, HENRY M., D.Sc., ETC.
Brief Biographical Sketch of Elkanah Billings.
American Geologist, XXVIII, 67-86.

AMI, HENRY M., D.Sc., ETC.
Dr. G. M. Dawson.
Reprint of article in *American Geologist* in 1900, with corrections and additions to bibliography, etc.

AMI, HENRY M., D.Sc., ETC.
Dr. G. M. Dawson.
Events, Ottawa, VII, 311.

ANDERSON, A., LL.D.
Prof. Chas. Macdonald: An Estimate.
Dalhousie Gazette, Dalhousie University, Halifax, N.S., XXXIII, 282.

ANDERSON, M.
Lundy's Lane and Stoney Creek. Letters from M. Anderson.
Wentworth Historical Society (Hamilton), Journal and Transactions, III, 9.

ANGWIN, REV. J. G.
Sailor and Saint.
Methodist Magazine & Review, Toronto, LIV, 415.

ARBORY, JOHN.
Old Quebec. (Verse.)
Canadian Magazine, Toronto, XVII, 357.

ARMITAGE, REV. W. J., M.A.
The Year-Book of St. Paul's Church, Halifax, N.S., 1901.
(Contains an historical sketch of St. Paul's Church, etc.)

ARMSTRONG, LOUIS OLIVER,
Hiawatha or Manabozho; an Ojibway Indian Play.
Privately Printed, Montreal, 1901.

ARMSTRONG, REV. W. D., M.A., PH.D. (Ottawa).
The Ladies College and its place in our educational system.
The Canada Educational Monthly, Toronto, XXIV, 81.

ARNETT, J. H.
A School Problem.
Educational Journal of Western Canada, Winnipeg, III, 37.

ASHMORE, ANNIE.
The Horns of the Altar.
Canadian Magazine, Toronto, XVI, 244.

ASLING, MISS STELLA E.
Historical St. Paul's,
Wentworth Historical Society (Hamilton), Journal and Transactions, III, 19.

AYLESWORTH, A. B., K.C.
The Bond Phi Sigma.
University of Toronto Monthly, I, 157.

AYLESWORTH, A. V.
A Director's Problems. (Kindergarten.)
Ontario Educational Association (Toronto), Transactions, 1901, p. 373.

B., G.
The war of trade between Great Britain and America.
The Commonwealth, Ottawa, I, 68.

B., J. E.
A poet's sister.
The Commonwealth, Ottawa, I, 64.

B., J. S.
Summer flowers. (Verse.)
Prince Edward Island Magazine, Charlottetown, II, 353.

B., R. H. C.
The North Pole, Canada's northern boundary.
University of Ottawa Review, III, 541.

BAILEY, DR. L. W.
A retrospect.
The University Monthly, University of New Brunswick, Fredericton, N.B., XX, 114.

BAIN, JAMES, LL.D.
Travels and Adventures in Canada and the Indian Territories between the years 1760 and 1776, by Alexander Henry, Fur Trader. New Edition, Edited with Notes, Illustrative and Biographical, by James Bain, Chief Librarian, Toronto Public Library, Toronto.
George N. Morang & Co., Toronto, 8vo., 1901, pp. 347.

BAIN, J. W.
Where engineers are educated.
Canadian Magazine, Toronto, XVI, 497.

BAIN, HON. THOMAS,
The Speaker and the House of Commons.
Journal and Proceedings of the *Hamilton Scientific Association*, 1901, pp. 26-39.

BAIRD, FRANK, M.A. (REV.).
A Masterpiece of God.
Canadian Magazine, Toronto, XVIII, 148. (See also *Dalhousie Gazette*, Dalhousie University, Halifax, N.S., XXXIV, 98.)

BAIRD, FRANK.
Henry Irving as Shylock.
The University Monthly, University of New Brunswick, Fredericton, N.B., XX, 170.

BAKER, NELLIE N.
Among the Doukhobors in Canada.
Missionary Review of the World, Aug., 1901, pp. 575-581.

BALFOUR, GRANT.
Canada my Home.
James Miller Grant, Toronto, 1901.

BALTIMORE, J. MAYNE.
From Mount Robert's summit.
Canadian Magazine, Toronto, XVII, 429.

BAMBRICK, J.
Traditions of the Early Acadians—Occupation of East River and St. Peters.
Prince Edward Island Magazine, Charlottetown, II, 360. 395.

BANTON, J. L.
Honesty as an only policy.
The Commonwealth, Ottawa, I, 205.

BARKER, J. S.
A Brief History of David Barker, a United Empire Loyalist.
Ontario Historical Society, Papers and Records, III, 168.

BARKER, CAPT. R. K.
The Rowing Season of 1901.
Canadian Magazine, Toronto, XVIII, 33.

BARR, ROBERT.
A Prince of Good Fellows. A series of eleven tales, based on the supposed adventures of James V. of Scotland. Illustrated by Edmund J. Sullivan.
McClure's Magazine, New York, 1901.

BARR, ROBERT.
The Victors: A Romance of Yesterday Morning and This Afternoon.
New York, *F. A. Stokes Co.*; Toronto, *The Copp Clark Company*, 8vo., 1901, pp. 575.

BARSS, J. EDMUND, M.A.
An Acadia Man.
Acadia Athenæum, Acadia College, Wolfville, N.S., XXVIII, 15.

BARRY, LILY E. F.
In the Paths of Peace. With illustrations by A. G. Racey.
Montreal, *The Canada Engraving and Litho. Co.*, 8vo., 1901, pp. 310.

BAYFIELD, H. A., B.A., Sc.
A day with Pheasants in Vancouver Island.
Prince Edward Island Magazine, Charlottetown, II, 354.

BEATON, WELFORD W.
Reveries of an angler.
Rod and Gun in Canada, Montreal, II, 500.

BEGG, ALEXANDER.
Review of the Alaska Boundary Question.
Scottish Geographical Magazine, January and February, 1901, pp. 30-40 and 86-96.

BELL, F. H.
Recollections (of Prof. Charles Macdonald).
Dalhousie Gazette, Dalhousie University, Halifax, N.S., XXXIII, 263.

BELL, J. M.
Explorations in the Great Bear region.
Geographical Journal, London. XVIII, 249.

BELL, ROBERT, M.D., C.M., LL.D., F.R.S.C.
Legends of the Slavey Indians of the Mackenzie River.
Journal of American Folk-Lore, XIV, 26-29.

BELLINGHAM, HENRIETTA G.
Quebec Cathedral. (Verse.)
North American Notes & Queries, Quebec, I, 260.

BENGOUGH, J. W.
Scenes from a Sky-Pilot's Parish, "Al."
Methodist Magazine and Review, Toronto, LIV, 76.

BENNETT, C. V., B.A. (Barrie, Ont.).
Tiberius: A character sketch.
Ontario Educational Association, Proceedings, Toronto, 230.

BENSLEY, B. ARTHUR, B.A. (late Fellow in Biology, University of Toronto).
The Sardine Industry in relation to the Canadian Herring Fisheries.
Contributions to Canadian Biology, 1901 (Supplement to the 32nd Annual Report of the Department of Marine and Fisheries, Ottawa). p. 59.

BERNARD, GEORGE.
The Coming Rise in Prices.
The Commonwealth, Ottawa, I, 168.

BERNARD, GEORGE.
Postage on Periodicals.
The Commonwealth, Ottawa, I, 228.

BERNARD, GEORGE.
A New Departure.
The Commonwealth, Ottawa, I, 103.

BERNIER, CAPTAIN J. E. (Quebec).
A Canadian Polar Expedition.
Proceedings Royal Canadian Institute, London, XXXII, 99.

BERRY, REV. J. P., B.A.
Missions and the Social Problems.
Methodist Magazine & Review, Toronto, LIV, 242.

BIGGAR, H. P., B.A., B.Litt. (*Oxon.*)
Early trading companies of New France. A contribution to the history of commerce and discovery in North America. H. P. Biggar, B.A., B.Litt., University of Toronto.
Toronto, *The University Library*, 1901, pp. XII, 308. (University of Toronto Studies in History. Edited by G. M. Wrong, M.A.)

BIGGAR, H. P., B.A., B.Litt. (*Oxon.*)
The French Hakluyt; Marc Lescarbot of Vervins.
The American Historical Review, July, 1901, pp. 671-692.

BILL, REV. INGRAM, M.A.
An educated gentleman.
Acadia Athenæum, Acadia College, Wolfville, N.S., XXVIII, 61.

BILL, REV. INGRAM, M.A.
Shipping upon the Great Lakes.
Acadia Athenæum, Acadia College, Wolfville, N.S., XXVIII, 10.

BINDLOSS, HAROLD.
The epic of a prairie farm.
Methodist Magazine & Review, Toronto, LIV, 28.

BINDLOSS, HAROLD.
The evolution of a wheat crop.
Littell's Living Age, New York, CCXXVIII, 48.

BINDLOSS, HAROLD.
Forest clearing in British Columbia.
The Imperial and Colonial Magazine, London, III, No. 1, pp. 81-95.

BINDLOSS, HAROLD.
A sower of wheat.
London, *Chatto & Windus*.
Toronto, *The Copp Clark Company*, 8vo., 1901, p. 373.

BISHOP, M. BLANCHE, M.A.
The star in the east (verse).
Acadia Athenæum, Acadia College, Wolfville, N.S., XXVIII, 108.

BLACK, NORMAN F. (Lindsay, Ont.)
Public school text-books.
Ontario Educational Association, Transactions, Toronto, 267.

BLAKE, W. H., B.A.
Professor Young in the lecture room.
The University of Toronto Monthly, I, 63.

BLEWETT, JEAN.
At Eastertide (verse).
Canadian Magazine, Toronto, XVI, 559.

BLEWETT, JEAN.
Grown Baby.
Canadian Magazine, Toronto, XVII, 116.

BLEWETT, JEAN.
A grey day and a golden.
Canadian Magazine, Toronto, XVII, 548.

BLUE, ARCHIBALD.
Notes on skulls taken from a prehistoric fort in Kent County.
Proceedings Canadian Institute, Toronto, II, 93-95.

BLUNT, J. E., C.B.
Brigands and Brigandage.
Year Book of Victoria Club, Boston, 1901.

BOLTON, MRS. C. E. (Bellwood, Ont.)
Some phases of infant mind.
Dominion Educational Association, Addresses and Transactions, Ottawa, 390.

BONE, JOHN R.
A new Canadian industry.
Canadian Magazine, Toronto, XVII, 564.

BONIS, HENRY, B.A.
Aims and methods in teaching Latin.
The Canada Educational Monthly, Torontot, XXIV, 102.

BONIS, HENRY, B.A.
Teaching grammar.
The Canada Educational Monthly, Toronto, XXIV, 102.

BOUCHER DE LA BRUÈRE, HON. P., D.C.L. (Superintendent of Public Instruction for the Province of Quebec).
Educational Bureau for the Dominion of Canada.
Dominion Educational Association, Addresses and Transactions, Ottawa, 76.

BOURINOT, SIR JOHN GEORGE, K.C.M.G., LL.D., F.R.S.C., etc.
British rule in the Dominion of Canada.
Forum, New York, March, 1901, pp. 1-14.

BOURINOT, SIR JOHN GEORGE, K.C.M.G., etc.
Builders of Nova Scotia.
Methodist Magazine & Review, Toronto, LIV, 105, 195, 301.

BOURINOT, SIR JOHN GEORGE, K.C.M.G., etc.
Canada in the Nineteenth Century.
(*In* "The Nineteenth Century: A Review of Progress." By C. C. Nott *and others.*) New York, 1901.

BOURINOT, SIR JOHN GEORGE, K.C.M.G., etc.
Canada under British Rule, 1760-1900. With eight maps.
The Copp Clark Co., Toronto, 8vo., 1901, pp. 346.

BOURINOT, SIR JOHN GEORGE, K.C.M.G., etc.
A manual of the constitutional history of Canada from the earliest period to 1901, including the British North America Act of 1867, a digest of the judicial decisions on important questions of legislative jurisdiction, and observations on the working of parliamentary government. (New edition, revised and enlarged.)
The Copp Clark Co., Toronto, 8vo., 1901, pp. 246.

BOURINOT, SIR JOHN GEORGE, K.C.M.G., etc.
The political institutions of Canada: A constitutional study.
The Imperial & Colonial Magazine & Review, London, March and April, 1901, pp. 201-208 and 302-310.

BOURINOT, SIR JOHN GEORGE, K.C.M.G., etc.
The United Empire Loyalists.
Paper read before the *London and Middlesex Historical Society*, London, Ont., and published in the *London Free Press*, Jan. 17th, 1901.

BOURINOT, SIR JOHN GEORGE, K.C.M.G., etc.
Royal visits to Canada.
Forum, New York, September, 1901.
Empire Review, London, October, 1901.

BOYD, HON. SIR J. A. (Chancellor).
The bar dinner (1901).
The Canada Educational Monthly, Toronto, XXIV, 57.

BOYD, S. J. A. (Exeter, Ont.)
How can we secure desirable changes in our public school regulations?
Ontario Educational Association, Transactions, Toronto, 364.

BOYD, W. H.
A day's visit to the Atlin Glacier.
McMaster University Monthly, Toronto, X, 303.

BOYLE, DAVID.
On the paganism of the Iroquois of Ontario.
Annual Archæological Report (being part of appendix to the report of the Minister of Education, Ontario, for the year 1901), 32.

BOYLE, DAVID.
The philosophy of folk-lore.
Annual Archæological Report, etc., 125.

BOYLE, DAVID.
Portrait of Father Marquette.
Ontario Historical Society, Papers and Records, Toronto, III, 167.

(BOYLE, DAVID).
Earthwork in Township of Moore.
Annual Archæological Report, etc., 32.

(BOYLE, DAVID).
Mounds generally.
Annual Archæological Report, etc., 30.

(BOYLE, DAVID).
Ossuary in Clinton township, Lincoln county.
Annual Archæological Report, etc., 22.

(BOYLE, DAVID).
Yellow Point Mound.
Annual Archæological Report, etc., 25.

BOYS, WILLIAM, F. A., LL.B. (Senior County Judge of the County of Simcoe, Ontario).
Early days of the University (of Toronto).
Supplement to the University of Toronto Monthly, II, 3 (December), pp. 36.

BRADLEY, A. G.
Chronicles of the Hudsons Bay Company.
Macmillan's Magazine, London, February, 1901, pp. 231-240.

BRAID, M. H.
Cairo and its panorama.
Canadian Magazine, Toronto, XVII, 399.

BRAITHWAITE, HENRY (*and* RISTEEN, F. H.)
How to build a bark canoe.
Rod and Gun in Canada, Montreal, II, 477.

BRAMBLE, CHARLES A.
The moose.
Rod and Gun in Canada, Montreal, II, 450.

BRAMBLE, CHARLES A.
Regarding woodcock.
Rod and Gun in Canada, Montreal, II, 416.

B(RAMBLE), CHARLES A.
Hints from a dog.
Rod and Gun in Canada, Montreal, II, 443.

BRIDGES, H. S. (St. John, N.B.).
Attention in the school—how it may be secured.
Dominion Educational Association, Addresses and Transactions, Ottawa, 356.

BRITTAIN, JOHN (Normal School, Fredericton, N.B.)
Bulletin of Nature Studies.
J. & A. McMillan, St. John, N.B., 1901.

BRITTAIN, JOHN.
Object lessons and nature study.
The Educational Review, St. John, N.B., XIV, 216, 241.

BRITTAIN, JOHN.
Public school education in New Brunswick.
Dominion Educational Association, Addresses and Transactions, Ottawa, 138.

BRITTAIN, JOHN.
The question of time.
The Educational Review, St. John, N.B., XIV, 164.

BRODIE, DR. WILLIAM.
Animal remains on Indian village sites.
Annual Archæological Report (being part of appendix to report of Minister of Education, Ontario, 1901), 44.

BROUGH, T. A., B.A.
Composition.
The Canada Educational Monthly, Toronto, XXIV, 71.

BROWN, J. H.
The art of poetry.
The Commonwealth, Ottawa, I, 42.

BROWN, J. H.
Politics.
The Commonwealth, Ottawa, I, 13.

BROWN, J. H.
Walt Whitman, poet and seer.
The Commonwealth, Ottawa, I. 146, 166.

BROWN, REV. J. W., PH.D.
Anti-Rationalism in the Early Christian Church, as represented by Tertullian and Arnobius.
Acadia Athenæum, Acadia College, Wolfville, N.S., XXVIII, 1.

BROWN, L.
A service at the Metropolitan Tabernacle.
McMaster University Monthly, Toronto, X, 195.

BROWN, L. D.
Indian occupation in Nissiouri.
Annual Archæological Report, Ontario, 38.

BROWN, R. H.
The habits of ruffled grouse.
Rod and Gun in Canada, Montreal, II, 502.

BROWN, ROBERT.
About Cape Breton. (Pamphlet).
Reprinted from *Year-Book of Victorian Club*, Boston, 1901. pp. 8.

BROWNE, REV. ADDISON.
Strength.
Acadia Athenæum, Acadia College, Wolfville, N.S., XXVIII, 7.

BROWNE, R. H.
Land tenure in Canada.
Report of the Commissioner of Crown Lands for Ontario, Toronto, 1901.

BROWNING, REV. A.
The conversion of Mametoose, Jun.
Methodist Magazine & Review, Toronto, LIII. 252.

BROWNING, REV. A.
Founder of empire.
Methodist Magazine & Review, Toronto, LIII, 63.

BROWNING, REV. A.
Jonah on board a man-of-war.
Methodist Magazine & Review, Toronto, LIII, 456.

BROWNING, REV. A.
The unanswered letter.
Methodist Magazine & Review, Toronto, LIV, 344.

BRYAN, CLAUDE.
Canadian voyageurs.
Empire Review, London, July, 1901.

BRYAN, CLAUDE.
The Duke and Duchess of York at home.
Canadian Magazine, Toronto, XVII, 501.

BRYAN, CLAUDE.
An Indian lullaby (verse).
Canadian Magazine, Toronto, XVI, 234.

BRYAN, CLAUDE.
Exploring in Ontario.
Canadian Magazine, Toronto, XVI, 303.

BRYAN, CLAUDE.
The lost cargo.
Canadian Magazine, Toronto, XVII, 58.

BRYAN, CLAUDE.
A pair of lunatics.
Canadian Magazine, Toronto, XVII, 378.

BRYAN, CLAUDE.
Winston Churchill.
Canadian Magazine, Toronto, XVI, 344.

BRYCE, GEORGE, LL.D., F.R.S.C.
Manitoba College thirty years old (pamphlet).
Winnipeg, 1901.

BRYDONE-JACK, PROFESSOR E.
The management and direction of steel bridge and structural work.
The University Monthly, University of New Brunswick, Fredericton, N.B., XXI, 30.

BRYMNER, DOUGLAS, LL.D., F.R.S.C.
Report on Canadian Archives.
Government Printing Bureau, Ottawa, 1901.

BURBIDGE, HON. G. W. (Judge, Exchequer Court of Canada).
The parent's responsibility to the state.
Dominion Educational Association, Addresses and Transactions, Ottawa, 386.

BURNS, H.
Some points of interest in Albert County (New Brunswick).
The University Monthly, University of New Brunswick, Fredericton, N.B., XX, 120.

BURPEE, LAWRENCE J.
Blackmore and *Lorna Doone*.
The Critic, New York, XXIX, 307.

BURPEE, LAWRENCE J.
Canadian novels and novelists.
Reprinted from *Transactions of the Literary and Scientific Society of Ottawa*. pp. 28.

BURPEE, LAWRENCE J.
A Canadian poet: Isabella Valency Crawford.
Poet-Lore, Boston, vol. XIII (new series, V), 575.

BURPEE, LAWRENCE J.
Canadian fiction.
World Wide, Montreal, I, 508.

BURPEE, LAWRENCE J.
Canadian prose writers.
The Commonwealth, Ottawa, I, 108, 130.

BURPEE, LAWRENCE J.
Canadian verse writers.
The Commonwealth, Ottawa, I, 85.

BURPEE, LAWRENCE J.
The Elizabeth books, and *The Golden Age*.
Events, Ottawa, VII, 633.

BURPEE, LAWRENCE J.
Charles Heavysege (with portrait).
Transactions of the Royal Society of Canada, Second Series, Vol. VII, Sec. II, p. 19.

BURPEE, LAWRENCE J.
Archibald Lampman.
Events, Ottawa, VII, 149.

BURPEE, LAWRENCE J.
Review of "Life and Letters of Huxley."
Events, Ottawa, 1901.

BURPEE, LAWRENCE J.
Review of "Life of Parkman."
Events, Ottawa, 1901.

BURPEE, LAWRENCE J.
Review of Morley's "Cromwell."
Events, Ottawa, 1901.

BURPEE, LAWRENCE J.
Review of Rosebery's "Napoleon."
Events, Ottawa, 1901.

BURPEE, LAWRENCE J.
Stories of French Canada.
Events, Ottawa, VII, 22.

BURPEE, LAWRENCE J.
An unconscious humorist.
Acta Victoriana, Victoria University, Toronto, XXIV, 198.

BURRITT, MRS. ALEXANDER.
Early settlement of Grenville County.
Women's Canadian Historical Society of Ottawa, Transactions, I, 61.

BURRITT, MRS. ALEXANDER.
The settlement of the County of Grenville.
Ontario Historical Society, Papers and Records, Toronto, III, 102.

BURRITT, JAMES H., B.A. (Pembroke, Ont.)
Voluntary schools.
Ontario Educational Association, Transactions, Toronto, 432.

BURWASH, E. M.
Winchester and the millenary.
Acta Victoriana, Victoria University, Toronto, XXV, 49.

BURWASH, REV. N., S.T.D., LL.D.
A manual of Christian theology.
William Briggs, Toronto, 8vo., 1901.

BURWASH, REV. N., S.T.D., LL.D.
The nineteenth century.
Methodist Magazine & Review, Toronto, LIII, 95.

BURWASH, REV. N., S.T.D., LL.D.
Nineteenth century theology: Its tendencies and probable outcome.
Methodist Magazine & Review, Toronto, LIII, 166.

BURWASH, REV. N., S.T.D., LL.D.
The Queen.
Acta Victoriana, Victoria University, Toronto, XXIV, 243.

BURWASH, REV. N., S.T.D., LL.D.
The University Bill.
Acta Victoriana, Victoria University, Toronto, XXIV, 353.

BYRNE, SAMUEL.
Canada's commercial metropolis (Montreal).
Catholic World, July, 1901.

C., F. H.
A day afield.
Rod and Gun in Canada, Montreal, II, 419.

CÆSAR, L., B.A. (Port Hope, Ont.)
Roman ruins: a ramble in an Oxford vacation.
Ontario Educational Association, Toronto, 222.

CAIUS, A. W.
Spooks—an incident of the last century.
McMaster University Monthly, Toronto, X, 319.

CAMERON, A.
"Have" rimes.
The Educational Review, St. John, N.B., XIV, 243.

CAMERON, A.
The King's English.
The Educational Review, St. John, N.B., XIV, 197.

CAMERON, A.
Misquotations and other things.
The Educational Review, St. John, N.B., XIV, 218.

CAMERON, A.
"Scotsman."
The Educational Review, St. John, N.B., XV, 8.

CAMERON, AGNES DEANS.
Can character be modified by education? If so, to what extent?
Canada Educational Monthly, Toronto, XXIV, 87.

CAMERON, AGNES DEANS.
The end of the story.
The Commonwealth, Ottawa, I, 229.

CAMERON, AGNES DEANS.
Kipling.
The Commonwealth, Ottawa, I, 127.

CAMERON, AGNES DEANS.
Lest we forget: A forgotten corner in a far-off colony.
The Commonwealth, Ottawa, I, 96.

CAMERON, AGNES DEANS.
A new year's call.
The Commonwealth, Ottawa, I, 170.

CAMERON, AGNES DEANS.
Our American cousins and patriotism.
Educational Journal of Western Canada, Winnipeg, III, 49.

CAMERON, AGNES DEANS.
Where west is east and east is west.
Canadian Magazine, Toronto, XVII, 45.

CAMERON, J. HOME, M.A. (University of Toronto).
Elements of French composition.
Henry Holt & Co., New York, 8vo, 1901.

CAMERON, JOHN.
Wild fowl and birds of passage.
Paper read before the *Oxford Historical Society*, Woodstock, Ont., on the 21st February, 1901.

CAMERON, P.
Christian science.
Queen's Quarterly, Queen's University, Kingston, VIII, 170.

CAMPBELL, A. C.
Britain's rivals and Britain's trade.
The Commonwealth, Ottawa, I, 147.

CAMPBELL, A. C.
A message to Spirit River.
The Commonwealth, Ottawa, I, 30.

CAMPBELL, A. C.
The progress of the single tax.
The Commonwealth, Ottawa, I, 186.

CAMPBELL, A. C.
The question for the twentieth century.
The Commonwealth, Ottawa, I, 14.

CAMPBELL, A. C.
Review of "The life of Henry George, by his son, Henry George, Jr."
The Commonwealth, Ottawa, I, 16.

CAMPBELL, CL. T., M.D.
The founding of London.
Paper read before the *London and Middlesex Historical Society*, London, Ont., and printed *in extenso* in the *London Free Press* and the *London Advertiser*, on the 25th October, 1901.

CAMPBELL, CL. T., M.D.
Studying early history.
Paper read before the *London and Middlesex Historical Society*, London, Ont., and printed *in extenso* in the *London Advertiser*, Nov. 28th, 1901.

CAMPBELL, F. J.
The yachting season of 1901.
Canadian Magazine, Toronto, XVIII, 43.

CAMPBELL, REV. JOHN, LL.D., F.R.S.C.
Spanish documents relative to the Canary Islands.
Transactions of the Canadian Institute, Toronto, Vol. VII, Part I, No. 13, p. 29.

CAMPBELL, REV. JOHN, LL.D., F.R.S.C.
Talks about books.
Presbyterian College Journal, Montreal, 1901.

CAMPBELL, JOHN W.
Wallace and Canada (verse).
Copyright, 15 Nov., 1901.

CAMPBELL, RODERICK, F.R.G.S.
The father of St. Kilda; twenty years in isolation in the subarctic territory of the Hudson's Bay Company. By Roderick Campbell, F.R.G.S., with portrait, London.
W. R. Russell & Co., Ltd., 1901, pp. XV, 327.

CAMPBELL, WILLIAM WILFRED, F.R.S.C.
Britain. (verse).
Westminster Gazette, London, Sept., 1901.

CAMPBELL, WILLIAM WILFRED, F.R.S.C.
The Dryad's house. (verse).
Spectator, London, December, 1901.

CAMPBELL, WILLIAM WILFRED, F.R.S.C.
Glen Eila. (verse).
Canadian Magazine, Toronto, XVI, 136.

CAMPBELL, WILLIAM WILFRED, F.R.S.C.
The home of song. (verse).
The Outlook, London, September, 1901.

CAMPBELL, WILLIAM WILFRED, F.R.S.C.
A series of sonnets: September, Our Heritage, etc.
Literature, London, Sept., Oct., etc., 1901.

CAMPBELL, WILLIAM WILFRED, F.R.S.C.
The vanguard: A poem for the new century (pamphlet).
Privately printed, Jan. 1st, 1901.

CAMPBELL, WILLIAM WILFRED, F.R.S.C.
Victoria Regina. (verse).
The Commonwealth, Ottawa, I, 20.
Also *Methodist Magazine & Review*, Toronto, LIV, 14.

CAMPBELL, WILLIAM WILFRED, F.R.S.C.
Wind: A lyric of summer. (verse).
Atlantic Monthly, Boston (August, 1901), LXXXVIII, 135.

CAMPBELL, MRS. W. W.
Origin of Canadian people.
Women's Canadian Historical Society of Ottawa, Transactions, I, 137.

CAPPON, JAMES, M.A. (Professor of English, Queen's University, Kingston, Ont.).
Britain's title in South Africa.
MacMillan & Co., London, 1901.

CAPPON, JAMES, M.A. (Professor of English, Queen's University, Kingston, Ont.).
Kruger, Hofmeyr and the Bond.
Queen's Quarterly, Kingston, Ont., April, 1901.

CAPPON, JAMES, M.A. (Professor of English, Queen's University, Kingston, Ont.).
Mark Twain as the American conscience.
Queen's Quarterly, Kingston, Ont., April, 1901.

CAPTAIN, THE.
A honeymoon in a sailing dinghy.
Canadian Magazine, Toronto, XVI, 434.

CARLING, SIR JOHN.
London pioneers.
Paper read before the *London and Middlesex Historical Society*, London, Ont., and printed in the *London Free Press*, Nov. 20th, 1901.

CARMAN, REV. ALBERT, D.D.
Queen Victoria—The elements of her greatness.
Methodist Magazine & Review, Toronto, LIII, 209.

CARMAN, ALBERT R.
A visit to Westminster.
Canadian Magazine, Toronto, XVIII, 122.

CARMAN, BLISS (and HOVEY, RICHARD).
Last songs from vagabondia.
Small, Maynard & Co., Boston, 12mo., 1901, pp. 79.

CARMAN, BLISS.
May and June (verse).
Living Age, New York, CCXXIX, 68.

CARMAN, BLISS.
Pictor ignotus (verse).
Cosmopolitan, New York, XXX, 248.

CARMAN, BLISS.
The point of view (verse).
The Outlook, New York, LXVIII, 787.

CARMAN, BLISS.
Tidings to Olaf (verse).
North American, Philadelphia, CLXXIII, 857.

CARNOCHAN, JANET (MISS).
Early records of St. Mark's and St. Andrew's churches, Niagara.
Baptisms in Niagara (Rev. Robert Addison).
Weddings at Niagara, 1792.
Burials, Niagara, 1792.
Register of baptisms, commencing 29th June, 1817, Township of Grimsby.
Register of marriages, township of Grimsby, U.C., commencing Aug., 1817.
Register of burials in the township of Grimsby.
Register of christenings in the Presbyterian Congregation, township of Newark, Upper Canada.
Register of births and baptisms, St. Andrew's church, Niagara.
Marriages celebrated by Rev. Robert McGill.
Ontario Historical Society, Papers and Records, Toronto, Vol. III, 7-86.

CARNOCHAN, JANET (MISS).
Count de Puisaye; or, a forgotten page of Canadian history.
Niagara Historical Society, Transaction No. 8.

CARNOCHAN, JANET (MISS).
Inscriptions and graves in Niagara Peninsula.
Niagara Historical Society, Transaction No. 8.

CARNOCHAN, JANET (MISS).
The problem of English composition in the high school.
Dominion Educational Association, Addresses and Transactions, Ottawa, 272.

CARSTAIRS, JOHN STEWART, B.A.
The culture-value of history.
Ontario Educational Association, Proceedings, Toronto, 299.

CARSTAIRS, JOHN STEWART, B.A.
Review of Chesnel's "Histoire de Cavelier de la Salle."
Review of Historical Publications Relating to Canada. The University of Toronto. Published by the Librarian, VI, 31.

CARSTAIRS, JOHN STEWART, B.A.
Review of Cumberland's "History of the Union Jack."
Review of Historical Publications Relating to Canada, VI, 13.

CARSTAIRS, JOHN STEWART, B.A.
Review of Green's "William Pitt, Earl of Chatham."
Review of Historical Publications Relating to Canada, VI, 35.

CARSTAIRS, JOHN STEWART, B.A.
Review of Hopkins' "Progress of Canada in the Century."
Review of Historical Publications Relating to Canada, VI, 18.

CARSTAIRS, JOHN STEWART, B.A.
Review of Townshend's "Military Life of Field-Marshal George, First Marquess Townshend.
Review of Historical Publications Relating to Canada, VI, 37.

CARTWRIGHT, CONWAY (REV.)
Personal reminiscences of Bishop Strachan.
Queen's Quarterly, Queen's University, Kingston, IX, 24.

CASSELMAN, A. C. (Toronto).
The German U.E. Loyalists of the County of Dundas.
Toronto, 8vo., 1901.

CASSIDY, JAMES.
Coal fields of Canada.
Chambers' Journal, London, Eng., LXXVIII, 310.

CATES, W. G.
Imperial proposals.
Acta Victoriana, Victoria University, Toronto, XXIV, 342

CHAMBERLAIN, ALEXANDER F.
Kootenay group-drawings.
American Anthropologist. N.S., Vol. III, 248-56.

CHAMBERLAIN, ALEXANDER F.
Kootenay "Medicine-Men."
Journal of American Folk-Lore, XIV, 95-99.

CHAMBERLAIN, ALEXANDER F.
Some items of Algonkian Folk-Lore.
Journal of American Folk-Lore, XIII, 271-277.

CHAMBERLAIN, ALEXANDER F.
Translation: A study in the transference of folk-thought.
Journal of American Folk-Lore, XIV, 165-172.

CHAMPION, REV. J. B.
The strenuous life.
Acadia Athenæum, Acadia College, Wolfville, N.S., XXVIII, 112.

CHARLTON, JOHN, M.P.
Annexation *vs.* Imperialism.
Canadian Magazine, Toronto, XVI, 215.

CHESLEY, EGBERT M., M.A.
The ideal philosophy of Leibnitz.
Acadia Athenæum, Acadia University, Wolfville, N.S., XXVIII, 262.

CHIPMAN, W. F.
February the 2nd (verse).
McGill Outlook, McGill University, III, 132.

CHOWN, ALICE A.
The supplement of higher education for women.
Methodist Magazine & Review, Toronto, LIV, 443.

CHURCHILL, HELEN T.
Curious addresses.
Canadian Magazine, Toronto, XVI, 220.

CLARK, JEREMIAH S.
Meskeek-Uum-Pudas (verse).
Acadia Athenæum, Acadia College, Wolfville, N.S., XXVIII, 60

CLARK, JOSEPH T.
The Duke: A passing glimpse.
Canadian Magazine, Toronto, XVIII, 3.

CLARK, PROFESSOR WILLIAM, D.C.L., F.R.S.C.
The death of the Queen.
Canadian Magazine, Toronto, XVI, 402.

CLARK, PROFESSOR WILLIAM, D.C.L., F.R.S.C.
Significance of Easter.
Canadian Magazine, Toronto, XVI, 505.

CLARK, PROFESSOR WILLIAM, D.C.L., F.R.S.C.
University education for the clergy.
University of Toronto Monthly, Toronto, I. 244.

CLARK, PROFESSOR WILLIAM, D.C.L., F.R.S.C.
The work of the Royal Society.
Canada Educational Monthly, Toronto, XXIV, 161.

CLARK, WILLIAM MORTIMER, K.C.
An Oriental university.
University of Toronto Monthly, Toronto, I, 291.

CLARKE, DR. C. K.
The outlook for Rugby in Ontario.
Queen's College Journal, Kingston, XXIX, 36.

CLARKE, C. LANGTON.
Alias "Jackson."
Canadian Magazine, Toronto, XVII, 368.

CLARKE, C. LANGTON.
Iolanthe.
Canadian Magazine, Toronto, XVI, 257.

CLARKE, G. HERBERT.
Bounty (verse).
Canadian Magazine, Toronto, XVII, 529.

CLARKSON, C., B.A. (*and* REYNAR, A. H.)
Annotated edition of Scott's "Lay of the Last Minstrel."
Toronto, *W. J. Gage & Co.*, 1901.

CLAWSON, J. W.
Siderial astronomy.
The University Monthly, University of New Brunswick, Fredericton, N.B., XX, 148.

CLAWSON, W. H.
The poetry of Archibald Lampman.
The University Monthly, University of New Brunswick, Fredericton, N.B., XXI, 74.

CLENDENNAN, D. W.
Some Presbyterian U.E. Loyalists (United Empire Loyalists).
Ontario Historical Society, Papers and Records, Toronto, III, 117.

Cleveland, Bert Marie.
Sunset (verse).
Canadian Magazine, Toronto, XVI, 428.

Coates, Harper H., B.A., B.D.
Civilization in Japan.
Acta Victoriana, Victoria University, Toronto, XXIV, 313.

Coleman, Professor A. P.
The new science building.
The University of Toronto Monthly, Toronto, I, 65.

Colquhoun, Arthur H. U.
A century of Canadian magazines.
Canadian Magazine, Toronto, XVII, 141.

Colquhoun, Arthur H. U.
Did Wolfe take Quebec?
Canadian Magazine, Toronto, XVII, 471.

Colquhoun, Arthur H. U.
Prime ministers of the Queen.
Canadian Magazine, Toronto, XVI, 408.

Colquhoun, Arthur H. U.
Roosevelt and Canada.
The Commonwealth, Ottawa, I, 183.

Colquhoun, Arthur H. U.
Significance of the royal visit.
Canadian Magazine, Toronto, XVII, 495.

Compton, Hubert.
Some recollections of Richmond Bay.
Prince Edward Island Magazine, Charlottetown, II, 366.

Conant, Thomas.
Re-afforesting Older Ontario.
Rod and Gun in Canada, Montreal, II, 481.

Connor, Ralph (*see* Gordon, Rev. Charles W.)

Cook, Rev. W. A., B.A. (Thorold, Ont.)
The whole Bible should be a text-book in our public schools.
Ontario Educational Association, Proceedings, Toronto, 436.

Cooper, John A.
Canada under Victoria, being four chapters contributed to a volume entitled "Queen Victoria," published by the *World Publishing Company*, Guelph, Ont., and now reprinted for private circulation.
Toronto, 1901, pp. 70.

Cooper, John A.
The Canadian mint.
Canadian Magazine, Toronto, XVII, 197.

Cooper, John A.
The failure of the Pan-American.
Canadian Magazine, Toronto, XVIII, 99.

Cooper, John A.
The first Imperial Federationist.
Acta Victoriana, Victoria University, Toronto, XXV, 112.

Cooper, John A.
The King and the university.
University of Toronto Monthly, Toronto, II, 11.

Cooper, John A.
Making one hundred magazines.
Canadian Magazine, Toronto, XVII, 194.

Cooper, John A.
Review of Hall Caine's "The Eternal City."
Canadian Magazine, Toronto, XVIII, 72.

Copland, John A.
A meteor king.
Copyright, 16th February, 1901.

COPELAND, AGNES GROTE.
Memoires (verse).
Privately printed, Toronto, 1901.

COPELAND, AGNES GROTE.
On the sunset sea (verse).
Privately printed, Toronto, 1901.

COPELAND, AGNES GROTE.
The queen's soliloquy (verse).
Privately printed, Toronto, 1901.

COTES, MRS. EVERARD (Sara Jeannette Duncan).
The crow's nest.
Methuen, London. *Dodd, Mead & Co.*, New York, 8vo., 1901.

COTES, MRS. EVERARD (Sara Jeannette Duncan).
A mother in India (a novelette).
Scribners, New York, 1901.

CRAGG, NORMAN W.
Not without avail.
Methodist Magazine & Review, Toronto, LIV, 174.

COULTHARD, G. C. (MISS).
A visit to the House of Lords.
The University Monthly, University of New Brunswick, Fredericton, N.B., XXI, 33.

COX, W. SHERWOOD.
La cravate rouge: A French-Canadian sketch.
McMaster University Monthly, Toronto, X, 151.

COX, W. SHERWOOD.
The spring that did not fall.
McMaster University Monthly, Toronto, X, 289.

COYNE, JAMES H., B.A.
A century of achievement.
Methodist Magazine & Review, Toronto, LIII, 50, 117.

CRAICK, W. ARNOT.
Port Hope: Historical sketches. (Ilustrated.).
Copyright, 26 November, 1901.

CRAWFORD, H. J.
Physical training at the university.
University of Toronto Monthly, Toronto, I, 200.

CREED, H. C., LITT. D.
Physical education, its place and scope.
Acadia Athenæum, Acadia University, Wolfville, N.S., XXVIII, 18.

CREIGHTON, G, (Inspector of Schools, Halifax).
Education in Nova Scotia.
Dominion Educational Association, Transactions, Ottawa, 350.

CROFTON, F. BLAKE.
Our fighting vocabulary.
Canadian Magazine, Toronto, XVII, 52.

CROMPTON, PHŒBE.
The leaden heel.
The Commonwealth, Ottawa, I, 50.

CROSS, G. W.
The Testament theology: Gould.
McMaster University Monthly, Toronto, X, 146.

CROSS, I. E.
Technical schools.
The Commonwealth, Ottawa, I, 106.

CRUIKSHANK, LIEUT.-COL. E.
Records of the services of Canadian regiments in the war of 1812. Part VI. Canadian Voltigeurs.
Proceedings Canadian Military Institute, Toronto, 1901.

Cruikshank, Lieut.-Col. E.
Review of Codman's "Arnold's Expedition to Quebec."
Review of Historical Publications relating to Canada. The University of Toronto. Published by the Librarian, VI, 47.

Cruikshank, Lieut.-Col. E.
Review of Halsey's "The Old New York Frontier."
Review of Historical Publications relating to Canada. VI, 28.

Cruikshank, Lieut.-Col. E.
Review of Hannay's "War of 1812."
Review of Historical Publications relating to Canada. VI, 53.

Cruikshank, Lieut.-Col. E.
Review of Roosevelt's "War with the U.S., 1812-1815."
Review of Historical Publications relating to Canada. VI, 53.

Cumberland, Barlow.
The story of a university building.
Canadian Magazine, Toronto, XVII, 235.

Cumming, L. H., LL.B.
The Clayton-Bulwer and Hay-Pauncefote Treaties.
Dalhousie Gazette, Dalhousie University, Halifax, XXXIII. 314.

Cummings, James.
South Africa and Canadian manufactures.
Industrial Canada, Toronto (convention number), Vol. II, No. 4, p. 124.

Currie, Mrs.
Story of Laura Secord, and Canadian reminiscences.
Wm. Briggs, Toronto, 8vo., 1901.

Currie, P. W.
Ancient drainage of Niagara Falls.
Transactions of the Canadian Institute, Toronto, Vol. VI, Part I, p. 7.

Dafoe, John W.
A call from the gorge: A story of the rivermen of Ottawa.
Canadian Magazine, Toronto. XVIII, 65.

Davidson, John, D.Phil. (Professor of Political Economy in the University of New Brunswick.)
The Canadian census.
British Economic Journal, London (Dec., 1901). XI, 595.

Davidson, Rev. J. W., B.A., B.D.
The Kaffir missionary Soga.
Methodist Magazine and Review, Toronto. LIV, 232.

Davin, Nicholas Flood.
In memory of the Queen. An Address. (Pamphlet), 1901.

Dawson, Miss M., B.Sc.
Anatomical characters of "Indian Soap."
Transactions of the Canadian Institute, Toronto. Vol. VII, Part I, p. 1.

Dawson, Rankine, M.A., M.D., M.R.C.S.E.
Fifty years of Work in Canada, scientific and educational. Being autobiographical notes by Sir William Dawson, C.M.G., LL.D., F.R.S., etc., etc. Edited by Rankine Dawson, M.A., M.D., M.R.C.S.E.
London and Edinburgh: *Ballantyne Hanson & Co.*, 1901, pp. X, 308.

Dawson, S. E., Litt.D., F.R.S.C.
The prose writers of Canada. An address delivered before the teachers of the city and district of Montreal.
E. M. Renouf, Montreal, 1901, pp. 39.

Deacon, J. S. (Milton, Ont.)
Public school libraries.
Ontario Educational Association, Toronto, 413.

Dearness, J. (London, Ont.)
Nature-study.
Ontario Educational Association, Toronto, 396.

DEARNESS, J. (London, Ont.)
The prescribed course of studies in the training schools.
Ontario Educational Association, Toronto, 395.

D'EASUM, BASIL C.
Fourteen days.
Canadian Magazine, Toronto, XVII, 465.

DELMAGE, EDITH R.
Madame Guyon.
McMaster University Monthly, Toronto, X, 204.

DEMILLE, A. B., M.A. (Professor of English literature and history, in the University of King's College, Windsor, N.S.).
City children, (verse).
Life, New York, June, 1901.

DEMILLE, A. B., M.A.
Canada's place in English literature.
The Commonwealth, Ottawa, I, 25.

DEMILLE, A. B., M.A.
Cross Island Light. (2,000 words).
Gray Goose Magazine, Cincinnati, Ohio, April, 1901.

DEMILLE, A. B., M.A.
A Curtailed Visit. (3,500 words).
Town and Country Magazine, New York, July, 1901.

DEMILLE, A. B., M.A.
Ballad.
Canadian Magazine, Toronto, XVII, 185.

DEMILLE, A. B., M.A.
A Death in Winter. (verse).
Canadian Magazine, Toronto, March, 1901.

DEMILLE, A. B., M.A.
Literature in the Century.
The Linscott Publishing Co., Toronto, London, Philadelphia, 8vo. 1901, pp. 548.

DEMILLE, A. B., M.A.
Longfellow's "Evangeline," with introduction and notes. Authorized for school use in Nova Scotia.
T. C. Allen & Co., Halifax, N.S., 1901.

DEMILLE, A. B., M.A.
Dr. A. H. MacKay. (Canadian Celebrities Series, No. XX.)
Canadian Magazine, Toronto, XVI, 310.

DEMILLE, A. B., M.A.
On certain literary possibilities.
Acadiensis, St. John, N.B., I, 126.

DENISON, LIEUT.-COL. GEORGE T.
Robert Grant Haliburton.
Canadian Magazine, Toronto, XVII, 126.

DENISON, LIEUT.-COL. GEORGE T.
Soldiering in Canada.
Geo. N. Morang & Co., Toronto, 8vo., 1901, pp. 364.

DENVERS, T. M., B.A.
Hymnology of the church.
Methodist Magazine and Review, Toronto, LIII, 238.

DE SOYRES, J.
Queen Victoria—A contrast.
Acadiensis, St. John, N.B., I, 51.

DEVLIN, H. S.
Saint Valentine's Day.
The University Monthly, University of New Brunswick, XXI.

DEWART, REV. E. H., D.D.
Early Canadian Methodist history.
Methodist Magazine and Review, Toronto, LIII, 46.

Dewart, Rev. E. H., D.D.
Preaching and pastoral work in the Twentieth Century.
Methodist Magazine and Review, Toronto, LIV, 320.

Dickson, James.
The white flag.
Rod and Gun in Canada, Montreal, II, 445.

Dingwall, E. Edna.
College and the student.
Acta Victoriana, Victoria University, Toronto, XXV, 67.

Dixon, Professor, (University of New Brunswick).
Address in praise of the founders of the University of New Brunswick.
The University Monthly, Fredericton, N.B., XX, 201.

Dobbie, J. A.
Drawing course of the public schools.
Dominion Educational Association, Transactions, Ottawa, 109.

Dole, Dr. W. P.
Translations of Horace.
The University Monthly, University of New Brunswick, XXI, 58.

Douglas, Graham.
Charlie—Circus usher.
Canadian Magazine, Toronto, XVIII, 181.

Douglas, James.
Some recollections of by-gone days.
Queen's College Journal, Kingston, XXVIII, 186.
Canadian Magazine, Toronto, XVIII, 181.

Dow, J. B. (Whitby, Ont.)
Teaching of languages in public schools.
Ontario Educational Association, Toronto, 423.

Dowsley, E.
The bugler boy.
Canadian Magazine, Toronto, XVII, 414.

Doxsee, E. R.
Reminiscences of Victoria University sixty years ago.
Acta Victoriana, Victoria Univ., Toronto, XXIV, 204.

Drew, E. B.
The China of a year ago and to-day.
Year-Book of Victorian Club, Boston, 1901.

Drummond, William Henry, M.D., F.R.S.C.
Johnnie's first moose, (verse).
Rod and Gun in Canada, Montreal, II, 445.

Drummond, William Henry, M.D., F.R.S.C.
Johnnie Courteau and other poems. With illustrations by Frederick Simpson Coburn.
G. P. Putnam's Sons, New York and London, 8vo., 1901, pp. 161.

Drummond, William Henry, M.D., F.R.S.C.
Little Bateese, (verse).
Littell's Living Age, New York, CCXXXI, 322.

Duckworth, Rev. H. T. F., M.A. (Trinity University, Toronto.)
St. John the almsgiver, the patriarch of Alexandria.
Blackwell, Oxford, 1901.

Duckworth, Rev. H. T. F., M.A. (Trinity University, Toronto.)
Manuals of Greek church doctrine.
Rivingtons, London, 1901.

Dugast, M. L'Abbé G.
(See Morice, Miss J. M.).

Duncan, John Macdonald, B.D., B.A.
George Paxton Young, LL.D.
University of Toronto Monthly, II, 60.

DUNCAN, NORMAN.
The chase of the tide.
McClure's Magazine, New York. August, 1901.

DUNCAN, SARA JEANNETTE.
(See COTES, MRS. EVERARD).

DUPUIS, NATHAN F., M.A., F.R.S. Edin. (Queen's University).
The Conservative and Liberal in education.
Queen's Quarterly, Queen's University, Kingston, Oct., 1901.

DUPUIS, NATHAN F., M.A.
Science.
Queen's College Journal, Kingston. XXVIII, 205.

DUPUIS, NATHAN F., M.A.
The study of Greek.
Queen's College Journal, Kingston. XXVIII, 284.

DURAND, EVELYN.
A river song (verse).
Canadian Magazine, Toronto, XVI, 428.

DURAND, EVELYN.
New Year (verse).
Canadian Magazine, Toronto, XVI, 328.

DURAND, EVELYN.
Hildegarde.
Canadian Magazine, Toronto, XVII, 323.

DYDE, S. W., M.A., D.Sc., LL.D. (Professor of Mental Philosophy, Queen's University).
Socrates, his person and work.
Queen's Quarterly, Queen's University, Kingston, Ont., July, 1901.

DYDE, S. W., M.A., D.Sc., LL.D.
The University question: The claims of Queen's.
Queen's College Journal, Kingston, XXVIII, 136.

DYDE, S. W., M.A., D.Sc., LL.D.
The University question:
(*a*) Is Queen's denominational?
(*b*) Relation of Queen's to the Provincial Government.
(*c*) The claim of Queen's.
Queen's College Journal, Kingston, XXIX, 37.

EASTMAN, H. M.
Development of rapid communication.
The University Monthly, University of New Brunswick, XX, 175.

EASTMAN, H. M.
The engineer as a factor in civilization.
The University Monthly, University of New Brunswick, XXI, 41.

EATON, REV. ARTHUR W. H.
Episcopalians in literature.
Book World, New York, 1901.

EATON, REV. ARTHUR W. H.
Pope's "Rape of the Lock." Edited with notes by Arthur W. H. Eaton.
New York, Boston and Chicago, *Silver Burdette & Co.*, 1901. pp. 67.

EATON, REV. ARTHUR W. H.
Preface to the "Churchman's Almanac."
Whittaker & Co., 1901.

EATON, REV. ARTHUR W. H.
Recollections of a Georgia Loyalist. Edited, with an introduction, by Arthur W. H. Eaton.
(See JOHNSTON, ELIZABETH LICHTENSTEIN.)

EATON, REV. CHARLES AUBREY.
The old Evangel and the new Evangelism.
Fleming H. Revell Co, Toronto, 8vo., 1901.

EATON, OLIVER MOWAT, (Athens, Ont.).
Rodney and Francis.
Copyright, 1901.

EDDIS, WILTON C., F.C.A., (Toronto).
Commercial education in our institutes and its objects.
Ontario Educational Associaton, Toronto, 317.

EDGAR, PROF. PELHAM.
Shelley and Keats as nature poets.
University of Toronto Monthly, II, 36.

EDGAR, W. W.
Interpretations (verse).
The Commonwealth, Ottawa, I, 50.

EDGAR, W. W.
Quatrains (verse).
The Commonwealth, Ottawa, I, 31.

EDWARDS, JAMES.
Kaid MacLean.
Canadian Magazine, Toronto, XVII, 329.

ELLIOTT, JUDGE W.
Early days of London.
Paper read before the *London and Middlesex Historical Society*, London, Ont., and printed *in extenso* in the *London Free Press*, Dec. 18th, 1901.

ELLIS, P. W. (President, Canadian Manufacturer's Association).
Annual address.
Industrial Canada, Toronto (Convention number), Vol. II, No. 4, p. 118.

ELLIS, PROF. W. H.
Henry Holmes Croft, D.C.L.
University of Toronto Monthly, II, 29.

ELLIS, W. S., B.A. (Kingston, Ont.)
Educational significance of kindergarten, nature study and manual training.
Dominion Educational Association, Addresses and Transactions. Ottawa, 163.

ELLS, R. W., LL.D., F.R.S.C.
Notes on the geology of Minas Basin and vicinity.
Acadia Athenæum, Acadia College, Wolfville, N.S., XXVIII, 153.

EMBREE, L. E., M.A. (Toronto.)
High school course as a preparation for the professions.
Ontario Educational Association, Transactions. Toronto, 117.

ENOL, F. W.
The enchanted wood.
McGill Outlook, McGill University, Montreal, III, 148.

ENOL, F. W.
Song.
McGill Outlook, McGill University, Montreal, III, 174.

E(NOL), F. W.
A Psalm of Law (verse).
McGill Outlook, McGill University, III, 152.

EVANS, REV. FRANCIS.
The establishment of the first district school in the Talbot district dated 1839.
Paper read before the *Norfolk County Historical Society*, Simcoe, Ont., March, 1901.

EVANS, W. SANFORD.
The Canadian contingents and Canadian Imperialism.
Toronto, *The Publishers Syndicate*; London, *T. Fisher Unwin*, 1901. pp. XII, 352.

FAIRBAIRN, M. L.
A decade of Canadian art.
Canadian Magazine, Toronto, XVII, 159.

FAIRCLOUGH, H. R., M.A.
University starvation.
University of Toronto Monthly, I, 146.

FALCONER, REV. R. A., D.LITT.
Heroes and hero-worship: a review.
Dalhousie Gazette, Dalhousie University, Halifax, N.S., XXXIV, 46.

F(ARMER), PROF. J. H. (McMaster University, Toronto).
A sample of the higher criticism.
McMaster University Monthly, Toronto, X.

FARMER, PROF. J. H., LL.D.
The Baptists of the Dominion of Canada. (Chapter XI, pp. 137-145, of "A century of Baptist achievement," edited by A. H. Newman, Philadelphia, *American Baptist Pub. Society*, 1901.)

FARR, C. C.
Ducks and duck shooting on Lake Temiscamingue.
Rod and Gun in Canada, Montreal, II, 475.

FARRANT, HOWARD.
Story of Im.
Canadian Magazine, Toronto, XVII, 551.

FARRELL, R. BRINDLE.
A mysterious manuscript.
The Commonwealth, Ottawa, I, 109.

FARRIS, J. W. DEB.
How to run a college paper.
Acadia Athenæum, Acadia College, Wolfville, N.S., XXVIII, 194.

FAWCETT, W.
The canals of Canada.
Scientific American, New York, LXXXIV, 89.

FELIX, PASTOR.
(*See* LOCKHART, ARTHUR J.).

FERGUSON, REV. GEORGE D., B.A. (Professor of History, Queen's University).
The development of law during the Middle Ages, especially in France and England.
Albany Law Journal, November, 1901.

FILELIS.
An Imperial coinage.
The Commonwealth, Ottawa, I, 202.

FINCH, A. HENEAGE.
A Swan Valley deer hunt in 1900.
Rod and Gun in Canada, Montreal, II, 499.

FINDLAY, W. N.
A plea for the teaching of civics.
Educational Journal of Western Canada, Winnipeg, III, 232.

FITZGIBBON, MARY AGNES.
The Jarvis letters.
Niagara Historical Society, Transactions No. 8, pp. 25-41. (Read before the Canadian Institute, Toronto).

FITZGIBBON, MARY AGNES.
The study of Canadian history.
Paper read before the *London and Middlesex Historical Society*, London, Ontario, and printed in the *Advertiser*, London, October 23rd, 1901.

FITZPATRICK, ALFRED.
Life in lumbering and mining camps.
Canadian Magazine, Toronto, XVII, 49.

Flather, J. M., M.A.
A selection of *Tales from Shakespeare*, by Charles and Mary Lamb. Edited with introduction, notes, and an appendix of extracts from Shakespeare, by J. M. Flather.
Copp Clark Co., Toronto, 1901.

Fleming, Sir Sandford, K.C.M.G., LL.D., etc.
Post office reforms in the Victorian era; and the development of an Imperial cable service.
Royal Society of Canada, Transactions, Second Series, Vol. VII, p. 75.

Fleming, Sir Sandford, K.C.M.G., LL.D., etc.
Post office reforms in the Victorian era.
The Commonwealth, Ottawa, I, 123.

Fleming, Sir Sandford, K.C.M.G., LL.D., etc.
The development of an Imperial postal and cable service.
The Commonwealth, Ottawa, I, 149.

Fletcher, Mary C.
Professor Charles Macdonald.
Dalhousie Gazette, Dalhousie University, XXXIII, 245.

Ford, Arthur R.
Summer clouds (verse).
Canadian Magazine, Toronto, XVII, 234.

Foster, Hon. George E.
Students and the new century.
Acta Victoriana, Victoria University, Toronto, XXV, 168.

Fowke, Gerard (*and* Smith, Harlan I).
Cairns of British Columbia and Washington.
Memoirs American Museum of Natural History, IV, 56-75.

Fowler, Dr. James (Professor of Botany, Queen's University, Kingston).
The flora of St. Andrews, New Brunswick.
Contributions to Canadian Biology, 1901. (Supplement to the 32nd Annual Report of the Department of Marine and Fisheries, Ottawa). p. 41.

Fraser, Charles G. (Toronto).
Should the Bible be a text-book in our public schools?
Ontario Educational Association, Toronto, 357.

Fraser, D. C., M.P.
Our old professor (Charles Macdonald).
Dalhousie Gazette, Dalhousie University, Halifax, N.S., XXXIII, 301.

Fraser, W. A.
Little Sister at Saint's Lake.
Ladies' Home Journal, XVIII, 11.

Fraser, W. A.
Mooswa, and others of the boundaries.
Canadian Magazine, XVI, 49, 157, 235, 354, 449, 561.

Fraser, W. A.
Nawaz Khan, the gift of Allah.
Littell's Living Age, CCXXVII, 707.

Fraser, W. A.
The outcasts. Illustrated by Arthur Heming.
William Briggs, Toronto, 8vo., 1901, pp. 138.

Fraser, W. A.
The snakes' paradise.
Canadian Magazine, Toronto, XVII, 116.

Fraser, W. H.
Il dolce stil nuovo.
Acta Victoriana, Victoria University, Toronto, XXV, 134.

Fraser, W. H., B.A. (Toronto).
Modern languages abroad.
Ontario Educational Association, Toronto, 123.

FRIEL, MRS. H. J.
The Rideau canal and the founder of Bytown.
Women's Canadian Historical Society of Ottawa, Transactions, Vol. I, 31.

G.
The university question: Government aid to one or more universities in Ontario.
Queen's College Journal, Kingston, XXIX, 18.

G., E.
Sir Joshua Reynolds.
The University Monthly. University of New Brunswick, Fredericton, N.B., XX, 176.

GADSBY, FRANKLIN.
A Christmas Pean (verse).
Canadian Magazine, Toronto, XVI, 143.

GADSBY, FRANKLIN.
To the twentieth century (verse).
Canadian Magazine, Toronto, XVI, 193.

GAGNON, PHILÉAS.
The author of "Labrador: a poem."
North American Notes and Queries, Quebec, I, 245.

GANONG, WILLIAM F., M.A., Ph.D.
A floral emblem for New Brunswick.
The Educational Review, St. John, N.B., XIV, 277.

GANONG, WILLIAM F., M.A., Ph.D.
Lease of the Seignieury of Freneuse, on the St. John River, in 1696.
Acadiensis, St. John, N.B., I, 121.

GANONG, WILLIAM F., M.A., Ph.D.
A monograph of the evolution of the boundaries of the Province of New Brunswick. (Illustrated). (Contributions to the history of New Brunswick, No. 5).
Transactions of the Royal Society of Canada, Second Series, Vol. VII, Part II, 137.

GANONG, WILLIAM F., M.A., Ph.D.
Origin of the Place-Name, Pabineau.
Acadiensis, St. John, N.B., I, 88.

GAUDET, PLACIDE P.
Jacau de Fiedmond.
Acadiensis, St. John, N.B., I, 29, 53.

GÉRIN, LÉON.
The Hurons of Lorette.
Report of the Ethnological Survey of Canada. (British Association for the Advancement of Science, Report, 1901), pp. 549-568.

GILPIN, E.
Minerals of Nova Scotia.
Halifax, N.S., 1901.

GILRÔY, W. E.
The truth shall make you free (verse).
Acta Victoriana, Victoria University, Toronto. XXIV, 351.

GODFREY, H. H.
A greeting to the King (song).
Toronto, 1901.

GODFREY, H. H.
Prince George (verse).
Toronto, 1901.

GODFREY, H. H.
F. H. Torrington (Canadian celebrities, No. XXVIII).
Canadian Magazine, Toronto, XVII, 540.

GOGGIN, D. J., M.A., D.C.L.
Elementary English grammar, prepared for use in Canadian schools, Toronto, *W. J. Gage & Co.*, 1901.

GOODFELLOW, D. K. (Beauharnois, P.Q.).
Reminiscences of David and Andrew Kemp.
Niagara Historical Society, Transactions No. 8, 1901.

GORDON, REV. CHARLES W. (Ralph Connor).
The man from Glengarry: a tale of the Ottawa.
Toronto, *The Westminster Co.*, 8vo., 1901, pp. 473.

GORDON, D. M., D.D.
Dalhousie's late professor (Charles Macdonald).
Dalhousie Gazette, Dalhousie University, Halifax, N.S., XXXIII. 269.

GORDON, W. C.
In the woods of New Ontario.
McMaster University Monthly, Toronto, X, 342.

GOSNELL, R. E.
History of British Columbia.
Copp Clark Co., Toronto, 1901.

GRADUATE.
University reform.
Vox Wesleyana, Wesley College, Winnipeg, V, 122.

GRAHAM, ANNIE S.
Nature study in primary grades.
Educational Journal of Western Canada, Winnipeg, III, 84.

GRAHAM, ERIC.
Of such is the nature of woman.
Acta Victoriana, Victoria University, Toronto, XXV, 143.

GRAHAM, H. W., B.A.
Alfred the Great.
Vox Wesleyana, Wesley College, Winnipeg, VI, 51.

GRAHAM, H. W., B.A.
An American problem.
Vox Wesleyana, Wesley College, Winnipeg, VI, 8.

GRAHAM, MARGARET M.
A glimpse at Browning's message to humanity.
Acta Victoriana, Victoria University, Toronto, XXIV, 395.

GRANT, CHARLES A.
A surveying tour in New Ontario.
McMaster University Monthly, Toronto, X. 248.

GRANT, GEORGE MUNRO, M.A., D.D., LL.D.
Address to convocation.
Queen's College Journal, Kingston, XXVIII, 281.

GRANT, GEORGE MUNRO, M.A., D.D., LL.D.
In memoriam, Charles Macdonald.
Dalhousie Gazette, Dalhousie University, Halifax, N.S., XXXIII, 255.

GRANT, GEORGE MUNRO, M.A., D.D., LL.D.
The university question.
Queen's Quarterly, Queen's University, Kingston, Ont., VIII, 211.

GRANT, GEORGE MUNRO, M.A., D.D., LL.D.
The university question: Queens and Toronto should occupy common ground.
Queen's College Journal, XXVIII, 228.

GRANT, W. L.
Cape Breton, past and present.
Canadian Magazine, Toronto, XVII, 435.

GRANT, W. L.
The Royal visit.
Queen's College Journal, Kingston, XXIX, 26.

GRAY, P. L.
Manual training.
Dominion Educational Association, Addresses and Transactions, Ottawa, 45.

GREEN, HAZEN.
The last of the nineteenth century in New York.
Prince Edward Island Magazine, Charlottetown, P.E.I., II, 393.

GRENFELL, W. T.
Life in Labrador.
Blackwood's Edinburgh Magazine, November, 1901.

GRIFFIN, GEORGE D.
The United Empire Loyalists of 1837.
Wentworth Historical Society, Journal and Transactions, Hamilton, Ont., III, 13.

GRIFFIN, JUSTUS A.
Militia rolls of 1866.
Wentworth Historical Society, Journal and Transactions, Hamilton, Ont., III, 83.

GRIFFIN, JUSTUS A.
Monument sites, with correspondence and papers relating thereto.
Wentworth Historical Society, Journal and Transactions, Hamilton, Ont., III, 91.

GRIFFIN, JUSTUS A.
Our first president.
Wentworth Historical Society, Journal and Transactions, Hamilton, Ont., III, 102.

GRIFFIN, JUSTUS A.
A relic of Saint Lucia.
Wentworth Historical Society, Journal and Transactions, Hamilton, Ont., III, 88.

GRIFFIN, MARTIN J.
Dying speeches and confessions of the nineteenth century.
Canadian Magazine, Toronto, XVI, 313.

GROTE, GEORGE WHITFIELD.
Ode on the burial of Queen Victoria (verse).
Privately printed, Toronto, 1901.

GROTE, GEORGE WHITFIELD.
Victoria Emanuel (verse).
Privately printed, Toronto, 1901.

GUERBER, H. A. (*See* WITHROW, W. H.).

H., O.
The mining trip.
McGill Outlook, McGill University, Montreal, IV, 94, 111, 122.

HAGARTY, E. W., B.A. (Toronto).
Quality *versus* quantity in the study of classics.
Ontario Educational Association, Transactions, Toronto, 247.

HALE, KATHARINE.
Some prominent players.
Canadian Magazine, Toronto, XVII, 35.

HALL, JOHN E.
The cricket season of 1901.
Canadian Magazine, Toronto, XVIII, 38.

HAMILTON, D. W.
Destruction of trees.
The University Monthly, University of New Brunswick, Fredericton, N.B., XX, 172.

HAMILTON, J. CLELAND, M.A., LL.B.
Educational problems in Toronto.
Anglo-American Magazine, New York, June, 1901, pp. 490-496.

HAMILTON, J. CLELAND, M.A., LL.B.
Notes from Lake Rosseau.
Anglo-American Magazine, New York, VI, 376.

HANBURY-WILLIAMS, CHARLES.
"As ithers see us."
The Commonwealth, Ottawa, I, 150.

HAND, THOMAS W.
The siege of Tientsin, and the destruction of the Boxer's stronghold by the allied forces (drama).
Hamilton, 1901.

HANNAY, JAMES, D.C.L.
History of the war of 1812, between Great Britain and the United States of America. By James Hannay, D.C.L., author of the History of Acadia, Life and Times of Sir Leonard Tilley, etc.
St. John, N.B. Printed by *John A. Bowes*, 8vo., 1901, pp. 400.
(Collections of the Nova Scotia Historical Society, Vol. IX, pp. 1-400.)

HARCOURT, HON. RICHARD.
College days.
Acta Victoriana, Victoria University, Toronto, XXV, 100.

HARDY, E. A., B.A.
An outline program of the work of the Ontario Library Association.
Public Libraries, Chicago, July, 1901, pp. 414.

HARDY, E. A., B.A.
Review of Theodore Rand's *Song-Waves*.
McMaster University Monthly, Toronto, X, 337.

HARPER, HENRY A., M.A.
The agricultural industry of Canada.
The Labor Gazette, Ottawa, I, 488, 555.

HARPER, HENRY A., M.A.
Canada's attitude towards labour.
The Commonwealth, Ottawa, I, 68, 88.

HARPER, HENRY A., M.A.
Colleges and citizenship.
Acta Victoriana, Victoria University, Toronto, XXIV, 207.

HARPER, HENRY A., M.A.
The copper and nickel industries in Canada.
The Labour Gazette, Ottawa, I, 282.

HARPER, HENRY A., M.A.
The fishing industry in Canada.
The Labour Gazette, Ottawa, I, 342, 416.

HARPER, HENRY A., M.A.
The iron industry in Canada.
The Labour Gazette, Ottawa, I, 217.

HARPER, HENRY A., M.A.
Labour organization in Canada: I. Historical.
The Labour Gazette, Ottawa, II, 90.

HARPER, HENRY A., M.A.
Labour organization in Canada: II. Trade union legislation.
The Labour Gazette, Ottawa, II, 158.

HARPER, HENRY A., M.A.
Legislation for the protection of employees about machinery.
The Labour Gazette, Ottawa, II, 168.

HARPER, HENRY A., M.A.
Legislation for the protection of employees on railways.
The Labour Gazette, Ottawa, II, 101.

HARPER, HENRY A., M.A.
Legislation for the protection of employees on ships.
The Labour Gazette, Ottawa, II, 286, 350.

HARPER, HENRY A., M.A.
Legislation in Canada for the protection of employees in mines.
The Labour Gazette, Ottawa, I, 297, 365, 438.

HARPER, HENRY A., M.A.
Legislation in Canada for the protection of employees in shops and stores.
The Labour Gazette, Ottawa, I, 241, 314.

HARPER, DR. J. M.
The earliest beginnings of Canada.
Toronto and Quebec. *Published for the Author*, 1901, pp. 104.

HARPER, DR. J. M.
Educational Bureau for the Dominion of Canada.
Dominion Educational Association, Addresses and Transactions, Ottawa, 70.

HARPER, DR. J. M.
The Fundamental Moral Principles in terms of which may be defined the Virtues and Vices of Humanity. The Moral Law and its Scriptural Developments used as a direct means for the moral training of the young. (Chart.)
Published for the Author, Quebec, 1901.

HARPER, DR. J. M.
The Third Element of Education.
Dominion Educational Association, Addresses and Transactions, Ottawa, 304.

HARRIS, P. D., B.A.
School Libraries.
Educational Journal of Western Canada, Winnipeg, III., (Nov. and Dec.), 1901.

HARRISON, F. C.
The Ripening of Cheese.
Transactions of the Canadian Institute, Toronto, Vol. VI, Part I, p. 103.

HARRISON, DR. THOMAS.
The Yale Bicentenary.
The University Monthly, University of New Brunswick, Fredericton, N.B., XXI, 13.

HARRISON, REV. W.
Biblical Criticism and its Results.
Methodist Magazine and Review, Toronto, LIV, 268.

HARRISON, REV. W.
The Churchmanship of John Leslie.
Methodist Magazine & Review, Toronto, LIV, 336.

HART, PERCY W.
The Young Martinet.
Canadian Magazine, Toronto, XVII, 557.

HART, THOMAS.
The Life History of Joseph Brown.
Paper read before the *Oxford Historical Society*, Woodstock, Ont., on the 11th April, 1901.

HART, REV. V. C., D.D.
The Printing-Press in China.
Acta Victoriana, Victoria University, Toronto, XXV, 75.

HARTWELL, GEORGE E., B.A., B.D.
Our Territorial Trust.
Acta Victoriana, Victoria University, Toronto, XXIV, 365.

HARVEY, ARTHUR, F.R.S.C.
Decimals and Decimalisation. A Study and Sketch. (Pamphlet).
Privately printed, Toronto, 1901.

HARVEY, JOHN.
The Newfoundland Seal Hunters.
Canadian Magazine, Toronto, June, 1901, p. 195.

HAULTAIN, T. ARNOLD, M.A.
Golf.
Contemporary Review, London, August, 1901. Reprinted in *Littell's Living Age*, September, 1901. Partially reprinted in *Golf*, New York, October, 1901.

HAULTAIN, T. ARNOLD, M.A.
The Literary Agent.
Literature, London, IX, 452.

HAULTAIN, T. ARNOLD, M.A.
Of Mirth.
University of Toronto Monthly, Toronto, I, 241.

HAULTAIN, T. ARNOLD, M.A.
A Winter's Walk in Canada.
Nineteenth Century and After, London, CCXCVI, 547. Reprinted in *Littell's Living Age*, CCXXXI, 478. Reprinted in *Wide World*, Montreal, 1901.

HAY, G. U., D.Sc.
Canadian History Readings.
Edited and published by G. U. Hay, Editor of *The Educational Review*, St. John, N.B., 1901, pp. 350.

HAY, G. U., D.Sc.
Notes on Teachers' Examinations.
The Educational Review, St. John, N.B., XV, 35.

HAY, G. U., D.Sc.
Public School History—Of England, by W. F. Robertson, LL.B.;
Of Canada, by G. U. Hay, D.Sc.
The Copp Clark Co., Toronto. *J. & A. McMillan*, St. John, N.B., 1901, pp. 289.

HAYDON, ALBERT E.
Garibaldi.
McMaster University Monthly, Toronto, X, 311.

HAYDON, ALBERT E.
Greek Tragedy.
McMaster University Monthly, Toronto, X, 354.

HAZELWOOD, M.
The House that Jack Built.
The Commonwealth, Ottawa, I, 89.

HELLIWELL, M. MACLEAN.
In the Queen's Name.
Canadian Magazine, Toronto, XVI, 364.

HEMMEON, DOUGLAS.
The Minister's Self-Abnegation.
Methodist Magazine and Review, Toronto, LIV, 165.

HEMSLEY, RICHARD. (Montreal).
Our Coats of Arms and Their Meanings, (folder).
Copyright. 19th August, 1901.

HENDERSON, JOHN, M.A.
Should Greek and Latin be retained as subjects in our Secondary Schools?
Dominion Educational Association, Addresses and Transactions, Ottawa, 200.

HENDERSON, JOHN, M.A.
Some Defects in the High School Curriculum.
Ontario Educational Association, Transactions, Toronto, 106.

HENRY, ALEXANDER. (*See* BAIN, JAMES.)

HENSHAW, JULIA A.
Why Not, Sweetheart?
George N. Morang & Co., Toronto, 1901, pp. 246.

HIGHEST, MINNIE E., M.A., Ph.D.
The Value of the Study of Philology in Modern Education.
Acta Victoriana, Victoria University, Toronto, XXIV, 401.

HILL, HAROLD J. TEMPLE.
Miss Wynifred Fraser.
Canadian Magazine, Toronto, XVI, 463.

HILL, HAROLD J. TEMPLE.
Foiled by a Violin.
Canadian Magazine, Toronto, XVII, 320.

HILL-TOUT, CHARLES.
Notes on the Sk.qómic of British Columbia, a branch of the Great Salish Stock of North America.
Report of the Ethnological Survey of Canada. (British Association for the Advancement of Science. Report, 1901.) Pp. 472-549.

HILL-TOUT, CHARLES.
The Origin of Totemism of the Aborigines of British Columbia.
Transactions of the Royal Society of Canada. Second Series, Vol. VII, Part II, 2.

HODGINS, GEORGE S.
The Kinetoscope.
Methodist Magazine and Review, Toronto, LIV, 461.

HODGINS, J. GEORGE, M.A., LL.D.
Documentary History of Education in Upper Canada from the passing of the Constitutional Act of 1791 to the close of the Rev. Dr. Ryerson's administration of the Education Department in 1876. By J. George Hodgins, M.A., LL.D. Vol. VIII, 1848, 1849.
Toronto, *L. K. Cameron*, Printer to the King, 1901, pp. XII, 308.

HODGINS, J. GEORGE, M.A., LL.D.
Incidents of International Courtesy.
The Anglo-American Magazine, New York, VI, 97.

HODGINS, J. GEORGE, M.A., LL.D.
Transitional Years of Education in Ontario, 1871-2.
Acta Victoriana, Victoria University, Toronto, XXIV, 304.

HODGINS, J. GEORGE, M.A., LL.D.
University Extension—Science a Commercial Factor.
Acta Victoriana, Victoria University, Toronto, XXIV, 356.

HODGINS, THOMAS, M.A.
University Endowments.
University of Toronto Monthly, II, 6.

HOGARTH, E. S., B.A.
The *Deutschamerikanischer Lehrertag.*
Ontario Educational Association, Transactions, Toronto, 133.

HOLLING, REV. T. E., B.A.
Epitaphs.
Methodist Magazine and Review, Toronto, LIV, 153.

HOLLING, REV. T. E., B.A.
Tennyson's Ministers.
Methodist Magazine and Review, Toronto, LIII, 112.

HOOVER, MARTIN.
Astronomy: The Great Macrocosm.
Winnipeg, 1901.

HOPKINS, J. CASTELL, F.S.S.
The Career of Edward VII.
The Forum, New York, March, 1901.

HOPKINS, J. CASTELL, F.S.S.
Morang's Annual Register of Canadian Affairs for 1901. Edited by J. Castell Hopkins, F.S.S.
George N. Morang & Co., Toronto, 8vo., 1901, pp. 540.

HOPKINS, J. CASTELL, F.S.S.
The Progress of Canada in the Nineteenth Century.
W. & R. Chambers, Edinburgh, 8vo., 1901, pp. 538.

HOPKINS, J. CASTELL, F.S.S.
The Story of the Dominion: Four Hundred Years in the Annals of Half a Continent.
J. C. Winston & Co., Philadelphia, Chicago and Toronto. Illustrated, 8vo., 1901, pp. xv, 644.

HORNUNG, PROF. L. E.
A Decade of Canadian Prose.
Canadian Magazine, Toronto, XVII, 150.

HORNUNG, PROF. L. E.
Faithful Unto Death.
Acta Victoriana, Victoria University, Toronto, XXV, 103.

HORNUNG, PROF. L. E.
Goethe's *Faust*.
Transactions of the Canadian Institute, Toronto, VII, Part I, p. 135.

HORNUNG, PROF. L. E.
Some Early Canadian Magazine Gleanings.
Acta Victoriana, Victoria University, Toronto, XXIV, 245.

HORSEY, AMY.
Early Settlement of Prince Edward County.
Women's Canadian Historical Society of Ottawa, Transactions, I. 70.

HOUSTON, WILLIAM, M.A.
Literary Selections for Advanced Classes in Public High Schools.
W. J. Gage & Co., Toronto, 1901.

HOWE, JONAS.
A Monument and its Story.
Acadiensis, St. John, N.B., I, 63,137.

HUGHES, MRS. A. M.
Education in Ontario.
Ontario Educational Association, Transactions, Toronto, 76.

HUGHES, JAMES L.
The National Economic Association.
Methodist Magazine and Review, Toronto, LIII, 59.

HUGHES, JAMES L.
Toronto.
Methodist Magazine and Review, Toronto, LIV, 33.

HUGHES, JAMES L.
The Training of Queen Victoria's Family.
Methodist Magazine and Review, Toronto, LIV, 494.

HUME, PROF. JAMES G., M.A., Ph.D.
Prohibition as a Problem of Individual and Social Reform.
Acta Victoriana, Victoria University, Toronto, XXIV, 248.

HUME, PROF. JAMES G., M.A., Ph.D.
Introduction to publication of the writings of Schopenhauer.
M. Walter Dunne Co., New York, 8 vo., 1901.

HUNT, FRANK L.
Britain's One Utopia.
Historical and Scientific Society of Manitoba, Transaction No. 61. Winnipeg, 1901, pp. 11.

HUNT, LEWIS, M.A., M.D.
University teaching as a training for the Medical Profession.
Acadia Athenæum, Acadia College, Wolfville, N.S., XXVIII, 311.

HUNTER, A. F., M.A.
The Ethnographical elements of Ontario.
Ontario Historical Society, Papers and Records, Toronto, III, 180.

HUNTER, A. F., M.A.
Notes on Huron Villages in Medonte, Simcoe County.
Annual Archæological Report. (Being part of Appendix to the Report of the Minister of Education, Ontario, 1901), 56.

HUNTER, A. F., M.A.
Wampum records of the Ottawas.
Annual Archæological Report, etc., 52.

HUNTER, A. T.
Some Practical Observations on our Training Camps.
Canadian Magazine, Toronto, XVII, 317.

HUNTER, REV. T. W.
The log of a Missionary Deputation in Dominica.
Methodist Magazine and Review, Toronto, LIII, 229.

HUTCHINS, REV. W. N., M.A.
The Fact of Christ.
Acadia Athenæum, Acadia College, Wolfville, N.S., XXVIII, 222.

HUTTON, PROF. MAURICE.
A Dream of Greek Letters.
Canadian Magazine, Toronto, XVII, 55.

I.
Love Letters of an English Woman.
The Commonwealth, Ottawa, I, 76.

I., E. W.
By Shore and Camp Fire.
Prince Edward Island Magazine, Charlottetown, II, 347. 404.

IDINGTON, JOHN, LL.B.
Average ages of Matriculants.
University of Toronto Monthly, I, 179.

INCH, DR. J. R.
Millenary of King Alfred the Great at Winchester.
The University Monthly, University of New Brunswick, XXI, 36.

INGRAM, J. FRANK.
The Mind of Christ the mould of Christian Doctrine.
McMaster University Monthly, Toronto. X, 360.

INNES, JOHN.
Wolves on the Range.
Canadian Magazine, Toronto, XVIII, 144.

IRWIN, REV. ALEX. J., B.A., B.D.
The Romance of the "Killing Time."
Methodist Magazine and Review, Toronto, LIV, 207, 352.

JACK, DAVID RUSSELL.
Book-Plates.
Acadiensis, St. John, N.B., I, 91, 115, 236.

JACK, DAVID RUSSELL.
The Indians of Acadia.
Acadiensis, St. John, N.B., I, 187.

JACK, DAVID RUSSELL.
The Last Moose of Vermont.
Acadiensis, St. John, N.B., I, 41.

JACK, DAVID RUSSELL.
Joseph Wilson Lawrence.
Acadiensis, St. John, N.B., I, 43.

JACK, DAVID RUSSELL.
Old Colonial Silver.
Acadiensis, St. John, N.B., I, 168.

JACK, DAVID RUSSELL.
The Wetmore Family.
Acadiensis, St. John, N.B., I, 243.

Jack, Isaac Allen.
Æsthetic attributes of Acadia.
Acadiensis, St. John, N.B., I, 169.

James, B. G.
Nature Study.
The Educational Review, St. John, N.B., XIV, 272.

James, C. C.
Notes on some Canadian Poets.
Acta Victoriana, Victoria University, Toronto, XXIV, 387.

Jamieson, M.
A glimpse of our city fifty years ago.
Women's Canadian Historical Society of Ottawa, Transactions, I, 36.

Jeffers, T. C., Mus. Bac.
Sound and Spirit.
Methodist Magazine and Review, Toronto, LIV, 341.

Jenkins, Mrs. F. M. S. (Ottawa).
Educational value of music: or, music as an integral part of education.
Dominion Educational Association, Addresses and Transactions, Ottawa, 380.

Jenner, Rev. J. Hugh, M.A.
Doubts and Doubters.
Acadia Athenæum, Acadia College, Wolfville, N.S., XXVIII, 275.

Johnson, George, F.S.S. (Dominion Statistician).
Canada's Exports of Manufactures.
Industrial Canada, Toronto, (Convention Number). Vol. II, No. 4, p. 84.

Johnson, George, F.S.S.
Canadian Industries.
Industrial Canada, Toronto, (Convention Number). Vol. II, No. 4, p. 85.

Johnson, George, F.S.S.
The new partnership.
The Commonwealth, Ottawa, I, 2.

Johnson, George, F.S.S.
Place-name oddities.
The Commonwealth, Ottawa, I, 62.

Johnson, George, F.S.S.
Statistical Year Book.
Government Printing Bureau, Ottawa, 1901.

Johnston, A. J.
A Triumph (verse).
Acta Victoriana, Victoria University, Toronto, XXV, 65.

Johnston, Elizabeth Lichtenstein.
Recollections of a Georgia Loyalist. Written in 1836. Edited by Reverend Arthur Wentworth Eaton, B.A.
New York. The Bankside Press. *M. F. Mansfield & Co.*, 1901, pp. 224.

Johnston, George L., B.A. (Hamilton, Ont.).
Which should be taught first, single or double entry?
Ontario Educational Association, Transactions, Toronto. 324.

Johnston, William, M.A., LL.D.
Educational requirements of to-day.
Dominion Educational Association, Addresses and Transactions, Ottawa, 294.

Johnston, William, M.A., LL.D.
Why do country inspectors not receive the same remuneration for their services as other county officials?
Ontario Educational Association, Transactions, Toronto, 421.

JOHNSTONE, H. MCBEAN.
The educating influences of the Camera Club.
Rod and Gun in Canada, Montreal, II, 510.

JOHNSTONE, H. MCBEAN.
The landscape—arrangement of mass. (Photography).
Rod and Gun in Canada, Montreal, II, 462.

JOHNSTONE, H. MCBEAN.
Why not follow directions? (Photography).
Rod and Gun in Canada, Montreal, II, 485.

JONES, MISS ALICE (Halifax, N.S.).
The Night-Hawk. A Romance of the '60's. By Alix John.
New York. *Frederick A. Stokes Co.*, 8vo., 1901, pp. 378.

JONES, GEORGE M., B.A. (Hagarsville, Ont.).
Stephen Phillips.
Ontario Educational Association, Transactions, Toronto. 183.

JONES, MISS L. L., B.A. (Cobourg, Ont.).
Hermann Sudermann.
Ontario Educational Association, Transactions, Toronto, 203.

JONES, J. W.
The diffusion of knowledge.
Acadia Athenæum, Acadia College, Wolfville, N.S., XXVIII, 233.

JONES, MABEL V.
The Passing Year (verse).
Acadia Athenæum, Acadia College, Wolfville, N.S., XXVIII, 51.

JONES, RALPH M.
A Chat about Father Knickerbocker.
Acadia Athenæum, Acadia College, Wolfville, N.S., XXVIII, 116.

JONES, RALPH M.
God's Discipline (verse).
Acadia Athenæum, Acadia College, Wolfville, N.S., XXVIII, 281.

JONES, R. V., Ph.D.
Echoes of the Past.
Acadia Athenæum, Acadia College, Wolfville, N.S., XXVIII.

JORDAN, REV. W. G., B.A., D.D. (Professor of Hebrew in Queen's University).
Amos the Man and the Book in the Light of Recent Criticism.
Biblical World, April, 1901.

JORDAN, REV. W. G., B.A., D.D.
The outlook for Old Testament Interpretation at the beginning of the Twentieth Century.
Biblical World, June, 1901.

JORDAN, REV. W. G., B.A., D.D.
Recent contributions to Old Testament Theology.
Queen's Quarterly, Queen's University, Kingston. Ont., October, 1901.

JORDAN, REV. W. G., B.A., D.D.
Review of Professor Royce's "The World and the Individual."
American Journal of Theology, April, 1901.

JORDAN, REV. W. G., B.A., D.D.
Review of Duff's "Old Testament Theology," Vol. II.
American Journal of Theology, January, 1901.

KEATS, H. A. (Mrs.) Mansfield, M.D.
Canadian Magazine, Toronto, XVI, 251.

KEIRSTEAD, REV. J. W.
The college man as a citizen.
Acadia Athenæum, Acadia College, Wolfville, N.S., XXVIII, 272.

KEIRSTEAD, E. M., D.D. (Professor of English Literature at Acadia College, Wolfville, N.S.).
The Baptists of the Maritime Provinces during the 19th Century. By E. M. Kierstead, D.D. In "Baptist Achievements in the Nineteenth Century," edited by Dr. A. H. Newman, and published by the *American Baptist Pub. Society*, Philadelphia), 1901.

KEMPTON, REV. JUDSON, M.A.
A Midsummer Night's True Tale.
Acadia Athenæum, Acadia College, Wolfville, N.S., XXVIII, 245.

KENNEDY, HENRY DAWSON (Peterboro, Ont.).
Jacob the Wrestler.
Copyright, 30th March, 1901.

KENNEDY, HOWARD ANGUS.
The French Canadians.
Proceedings Royal Colonial Institute, London, XXXIII, 52.

KENNY, MARGARET.
Peter Klengersmith.
Paper read before the *Norfolk County Historical Society*, Simcoe, Ont., in March, 1901.

KENNY, F. GERTRUDE.
Municipal Growth in the district of Dalhousie.
Women's Canadian Historical Society of Ottawa, Transactions, I, 9.

KENNY, F. GERTRUDE.
Some account of Bytown.
Women's Canadian Historical Society of Ottawa, Transactions, I, 22.

KENNY, F. GERTRUDE. (See also under MCDOUGALL, Mrs. J. Lorn, Jr.)

KERR, EDITH, B.A.
The First Parliament of Upper Canada.
Women's Canadian Historical Society of Ottawa, Transactions, I, 158.

KERR, W. A. R., B.A. (Upper Canada College).
Nahe Des Geliebten (verse).
Canadian Magazine, Toronto, XVII, 17.

KERR, W. A. R., B.A.
A Summer Among the *Habitants*.
Ontario Educational Association, Toronto, 165.

KERR, W. A. R., B.A.
Golf in Canada.
Canadian Magazine, Toronto, XVII, 340.

KETCHUM, MRS. JESSE.
Battle of Lundy's Lane.
Women's Canadian Historical Society of Ottawa, Trans., Vol. I, 168.

KIDNER, F.
Hamilton's Crystal Palace.
Wentworth Historical Society, Journal and Transactions, III, 38.

KIDNER, F.
Odds and ends of early life in Hamilton.
Wentworth Historical Society, Journal and Transactions, III, 72.

KIDNER, T. B. (Truro, N.S.).
Manual Training.
Dominion Educational Association, Ottawa, 121.
Also in *The Educational Review*, St. John, N.B., XV, 127.

KING, W. L. MACKENZIE.
The Late Henry A. Harper.
The Labour Gazette, Ottawa, II, 325.

KINGSMILL, ESTHER TALBOT.
The Heart of a Red-Man.
Canadian Magazine, Toronto, 1901, p. 508.

KIRBY, WILLIAM, F.R.S.C.
Memoir of the Whitmore Family of Niagara.
Niagara Historical Society Transaction No. 8, pp. 19 to 24.

KIRBY, WILLIAM, F.R.S.C.
Memorials of the Servos Family.
Niagara Historical Society, Transaction No. 8, pp. 1 to 19.

KIRSCHMAN, A., M.A., Ph.D. (University of Toronto).
"Fundamental Problems of Suggestion," in ***Hypnotism and Hypnotic Suggestion***.
Rochester, N.Y., 1901.

KLOTZ, OTTO J.
Technical Education.
Official Book, Trades and Labour Council of Canada, 1901.
Also in *The Commonwealth*, Ottawa, I, 26.

KNIGHT, DR. A. P. (Professor of Animal Biology, Queen's University, Kingston).
The Effects of Polluted Waters on Fish-Life.
Contributions to Canadian Biology, 1901. (Supplement to the 32nd Annual Report of the Department of Marine and Fisheries, Ottawa), p. 9.

LABAT, GASTON P.
Le Livre d'Or (The Golden Book) of the Canadian Contingents in South Africa, with an Appendix on Canadian Loyalty, containing letters, documents, photographs, portraits of Queen Victoria, King Edward VII, and the Queen of England. By Gaston P. Labat. (With an introductory letter by Dr. Louis Fréchette).
Montreal, 1901, pp. XII, 170; XII, 194, 66.

LAIDLAW, LIEUT. G. E.
Gambling Among the Crees with Small Sticks.
American Antiquarian, XXIII, 275-276.

LAIDLAW, LIEUT. G. E.
Notes on North Victoria Village Sites.
Annual Archæological Report. (Being part of Appendix to the Report of the Minister of Education, Ontario, 1901). 100.

LAIDLAW, LIEUT. G. E.
Some Ethnological Observations in South Africa.
Annual Archæological Report, etc., 1901, p. 132.

LAIDLAW, LIEUT. G. E.
Wooden Relics.
American Antiquarian, XXIII, 248-258.

LAIDLAW, T.
Scholar and something more.
Educational Journal of Western Canada, Winnipeg, III, 41.

LAIRD, R.
Some suggestions as to the Form and Method of St. Paul's teaching.
Queen's Quarterly, Queen's University, Kingston, VIII, 268.

LAMBLY, REV. O. R., M.A., D.D.
More Hours with our Hymn-Book.
Methodist Magazine and Review, Toronto, LIII, 541.

LAMOTHE, MME. H. G.
A page from the Annals of our First Missions.
Women's Canadian Historical Society of Ottawa, Transactions, I, 111.

LAMPMAN, ARCHIBALD, F.R.S.C.
Poems. (New Edition).
George N. Morang & Co., Toronto, 1901, pp. 473.

LANCEFIELD, R. T.
The Prince of Wales' Visit to Canada.
Canadian Magazine, Toronto, XVI, 420.

LAND, JOHN H.
The Story of Robert Land, United Empire Loyalist.
Niagara Historical Society, Transaction No. 8, 1901, pp. 42-46.

LANE, C. H.
Notes taken in New York City.
The University Monthly, University of New Brunswick, Fredericton, XX, 102.

LANG, A. E.
The Mission of the Theological Faculties.
Acta Victoriana, Victoria University, Toronto, XXV, 162.

LANG, S. E.
The Teaching of History.
Educational Journal of Western Canada, Winnipeg, III, 69.

LANG, PROF. W. R.
Poison Lore.
Acta Victoriana, Victoria University, Toronto, XXV, 154.

LANGTON, H. H., B.A. (Librarian, University of Toronto).
Sir Daniel Wilson, a biographical sketch with bibliography of his writings.
Review of Historical Publications relating to Canada, University of Toronto, 1901.

LARUE, LEA.
The Second Administration of Frontenac.
Women's Canadian Historical Society of Ottawa, Transactions, I, 129.

LAUDER, MRS. DE TOUFFE.
The Last Night and its Vision (verse).
Methodist Magazine and Review, Toronto, LIII, 244.

LAUT, MISS A. C.
Wanted—A Better Loyalty.
The Commonwealth, Ottawa, I, 12.

LAVELL, ALFRED E., B.A.
Our Prison Problem.
Methodist Magazine and Review, Toronto LIII, 501.

LAWSON, FRANK.
A Heart Cry (verse).
Canadian Magazine, Toronto, XVII, 433.

LAYCOCK, REV. J.
My All in All (verse).
Methodist Magazine and Review, Toronto, LIV, 414.

LEAKE, ALBERT H.
Manual Training.
The Canada Educational Monthly, Toronto, XXIV, 67.

LEAKE, ALBERT H.
Manual Training in Ottawa.
Canadian Magazine, Toronto, XVI 538.

LEFROY, CATHERINE F.
Recollections of Mary Warren Breckenridge, of Clarke Township.
Ontario Historical Society, Papers and Records, III, 110.

LEFROY, PROFESSOR.
University Training as a preparation for the Legal Profession.
University of Toronto Monthly, I, 263.

LEHIGH M. STANLEY.
Victor and Other Poems.
Published for the Author, Frankville, Ont., 1901.

LEITCH, P. J.
Poems and Lectures.
Printed for the Author, Montreal, 1901.

LEMAY, GEORGE.
The Present-Day French Canadian.
Anglo-American Magazine, New York, April, 1901.

LEMOINE, SIR JAMES M., F.R.S.C., etc.
The Port of Quebec: Its Annals, 1535-1900.
The Chronicle Printing Co., Quebec, 1901, pp. 95.

LEPAGE, THOMAS.
Evening (verse).
Dalhousie Gazette, Dalhousie University, Halifax, N.S., XXXIV, 6.

LEPAGE, THOMAS.
Quid Mihi Adfers? (verse).
Dalhousie Gazette, Dalhousie University, Halifax, N.S., XXXIV, 37.

LEPAGE, THOMAS.
To the New Year (verse).
Dalhousie Gazette, Dalhousie University, Halifax, N.S., XXXIII, 153.

LEPAGE, THOMAS.
Two Pictures (verse).
Dalhousie Gazette, Dalhousie University, Halifax, N.S., XXXIV, 33.

LEPAGE, THOMAS.
Two Summer Eves (verse).
Dalhousie Gazette, Dalhousie University, Halifax, N.S., XXXIV, 20.

LEREW, G. A.
Are the French and German children learning the English language?
Educational Journal of Western Canada, Winnipeg, Man., III, 237.

LEROSSIGNOL, PROF. J. E.
Economics in the High School.
Canadian Magazine, Toronto, XVII, 68.

LESUEUR, W. D., LL.D.
The Essentials of Culture.
The Commonwealth, Ottawa, I, 9.

LESUEUR, W. D., LL.D.
The Problem of Popular Government.
University of Toronto Monthly, I, 229, 257.

LESUEUR, W. D., LL.D.
Professor Goldwin Smith on the Decay of Religion.
The Commonwealth, Ottawa, I, 22.

LESUEUR, W. D., LL.D.
Questions for the Twentieth Century.
The Commonwealth, Ottawa, I, 45.

LESUEUR, W. D., LL.D.
Review of Crozier's *History of Intellectual Development on the Lines of Modern Evolution,* Vol. III.
The Commonwealth, Ottawa, I, 193.

LEWIS, HELEN F. M.
A Visit to Corea in 1899.
Canadian Magazine, Toronto, XVI, 491.

LEWIS, JOHN.
Imperialism—Quantity and Quality.
The Commonwealth, Ottawa, I, 8.

LEWIS, JOHN.
Patriotism in the Schools.
The Canada Educational Monthly, Toronto, XXIV, 243.

LEWIS, JOHN.
The Philosophy of Lampman.
The Commonwealth, Ottawa, I, 28.

LEWIS, JOHN.
The Wild Heart of Man.
Canadian Magazine, Toronto, XVII, 218.

LEWTHWAIT, E.
Women's Work in Western Canada.
Fortnightly Review, London, LXXVI, 709.

LIFFITON, FLORENCE.
Ether Music (verse).
Methodist Magazine and Review, Toronto, LIV, 340.

LIFFITON, FLORENCE.
Farewell to the Old Year (verse).
Methodist Magazine and Review, Toronto, LIV, 493.

LIGHTHALL, W. D., M.A., F.R.S.L.
The "Glorious Enterprise." The plan of Campaign for the Conquest of New France; its origin, history and connection with the Invasions of Canada, (pamphlet).
Privately printed, Montreal, 1901, pp. 38 and table.

Lighthall, W. D., M.A., F.R.S.L.
The Plan of Campaign (pamphlet).
Reprinted from the *Canadian Antiquarian*. Third series, Vol III, No. 5, Montreal, 1901, pp. 38 and table.

Lighthall, W. D., M.A., F.R.S.L.
Hiawatha the Great (pamphlet).
Reprinted from the *Transactions of the Royal Society of Literature*, London, XXIII, Pt. 1, 1901, pp. 18.

Linton, William, (Galt, Ont.).
Should Minors be licensed to teach in our Public Schools?
Ontario Educational Association, Transactions, Toronto, 347.

Lloyd, Wallace.
Bergen Worth (a novel).
Langton & Hall, Toronto, 8vo., 1901.

Lockhart, Rev. Arthur John (*Pastor Felix*).
An Autumn Hymn (verse).
Methodist Magazine and Review, Toronto, LIV, 358.

Lockhart, Rev. Arthur John.
An End of Song (verse).
Methodist Magazine and Review, Toronto, LIII, 469.

Lockhart, Rev. Arthur John.
The Fathers (verse).
Methodist Magazine and Review, Toronto, LIII, 544.

Lockhart, Rev. Arthur John.
Ferdinand Freiligrath.
Methodist Magazine and Review, Toronto, LIII, 125.

Lockhart, Rev. Arthur John.
Have the Birds Come? (verse).
Methodist Magazine and Review, Toronto, LIV, 186.

Lockhart, Rev. Arthur John.
George Martin (verse).
Methodist Magazine and Review, Toronto, LIV, 460.

Lockhart, Rev. Arthur John.
Migration (verse).
Methodist Magazine and Review, Toronto, LIII, 58.

Lockhart, Rev. Arthur John.
The Parting Year (verse).
Methodist Magazine and Review, Toronto, LIV, 512.

Lockhart, Rev. Arthur John.
The Song Sparrow (verse).
Methodist Magazine and Review, Toronto, LIII, 522.

Lockhart, Rev. Arthur John.
Victoria (verse).
Methodist Magazine and Review, Toronto, LIII, 277.

Logan, J. W., B.A.
Recollections of Prof. Macdonald.
Dalhousie Gazette, Dalhousie University, Halifax, N.S., XXXIII, 296.

Longley, Hon. J. W., D.C.L.
Marie Corelli.
Acadia Athenæum, Acadia College, Wolfville, N.S., XXVIII, 142.

Longworth, Israel.
Honourable Judge Robie.
Acadiensis, St. John, N.B., I, 81, 143.

Loudon, James, M.A., LL.D. (President of Toronto University.)
Commercial Education.
University of Toronto Monthly, I, 242.

Loudon, James, M.A., LL.D.
The Origin of Technical Education in Ontario.
University of Toronto Monthly, I, 148.

LOUDON, JAMES, M.A., LL.D.
Rudolph Koenig.
University of Toronto Monthly, II, 41.

LOUDON, JAMES, M.A., LL.D.
The University and State Aid.
University of Toronto Monthly, I, 135.

LOUDON, JAMES, M.A., LL.D.
The University Question.
Events, Ottawa, VII, 273.

LOUGH, HELEN BAPTIE.
Life's Stream (verse).
Canadian Magazine, Toronto, XVII, 125.

LOUGH, HELEN BAPTIE.
Northman's Welcome (verse).
Canadian Magazine, Toronto, XVII, 563.

LOUNGER, THE.
Children.
Events, Ottawa, VII, 344.

LOUNGER, THE.
Montcalm's Private Letters.
Events, Ottawa, VII, 677.

LOW, MAY AUSTIN.
Baby Bunting.
Canadian Magazine, Toronto, XVII, 553.

LOW, MAY AUSTIN.
A Song in Spring.
Canadian Magazine, Toronto, XVII, 111.

LOW, MAY AUSTIN.
Sunset at Chambly (verse).
Canadian Magazine, Toronto, XVII, 219.

LOW, MAY AUSTIN.
War (verse).
Canadian Magazine, Toronto, XVI, 353.

LOW, REV. G. J., D.D.
The Decline of Honour.
The Commonwealth, Ottawa, I, 17.

LOW, REV. G. J., D.D.
The Late Right Rev. I. Hellmuth.
The Commonwealth, Ottawa, 157.

LOW, REV. G. J., D.D.
Iconoclasm.
The Commonwealth, Ottawa I. 57.

LOW, REV. G. J., D.D.
Pleonasm in the Prayer-Book.
The Commonwealth, Ottawa I, 37.

LOW, REV. G. J., D.D.
Shirley and Yorkshire in 1812.
The Commonwealth, Ottawa, I, 97.

LOW, REV. G. J., D.D.
Spelling Reform.
The Commonwealth, Ottawa, I, 117.

LUCAS, AQUILA.
Manual Training.
The Educational Review, St. John, N.B., XV, 9.

LUCAS, AQUILA.
The Summer School of Manual Training and some results
The Educational Review, St. John, N.B., XV, 61.

LYONS, R. N.
The Private Secretary.
Copyright, 23 April, 1901.

M. Wanted—A Humble Man.
Prince Edward Island Magazine, Charlottetown, II, 409.

M., A. H.
Arbor Day.
The Educational Review, St. John, N.B., XIV, 247.

M., B.
Scott's Women.
University of Ottawa Review, III, 519.

M., E. L.
Charlottetown, Fifty Years Ago.
Prince Edward Island Magazine, Charlottetown, II, 343, 412.

M., H.
The Folk-Lore of Shakespeare's Garden.
McGill Outlook, McGill University, Montreal, III, 116.

M., H.
"Victoria the Good."
McGill Outlook, McGill University, Montreal, III, 131.

M., M.
Victoria the Good.
Methodist Magazine and Review, Toronto, LIII, 213.

M., T.
The Prisoned Flowers (verse).
Prince Edward Island Magazine, Charlottetown, II, 394.

M., W. A.
The Judgment and the Sentence.
Educational Journal of Western Canada, Winnipeg, III, 78.

M., W. A.
The Oral Expression of Children.
Educational Journal of Western Canada, Winnipeg, III, 86.

MACALLUM, PROF. A. B.
Huxley and Tyndall and the University of Toronto.
University of Toronto Monthly, I, 69.

MACCABE, J. A., LL.D.
The Training of Teachers in Ontario.
Ontario Educational Association, Transactions, Toronto, 381.

MACCALLUM, D. C.
Addresses at McGill University.
Montreal, 1901.

MACDONALD, DUGALD (Mount Royal Vale, P.Q.).
Ancient Science, or Secrets of Pyramids, Walls and Temples.
Copyright, 1901.

MACDONALD, ELIZABETH ROBERTS.
At Yule-Tide (verse).
Canadian Magazine, Toronto, XVI, 144.

MACDONALD, ELIZABETH ROBERTS.
In August's Flare (verse).
Canadian Magazine, Toronto, XVII, 322.

MACDOUGALL, MRS. J. LORN.
Renfrew in the Early Days.
Women's Canadian Historical Society of Ottawa, Transactions, Ottawa, I, 55.
(*See* also KENNY, MISS GERTRUDE.)

MACFARLANE, JOHN.
The Canadian Patriotic Calendar for 1901. With Verses by John MacFarlane.
(Lord Strathcona presented one of these Calendars to each member of Strathcona's Horse, and the balance of a large edition was distributed to returned Canadian soldiers by the publishers.)

MACFARLANE, THOMAS, F.R.S.C.
Chamberlain's Chaff.
The Commonwealth, Ottawa, I, 188.

MACFARLANE, THOMAS, F.R.S.C.
Preferential Trade.
The Commonwealth, Ottawa, I, 43.

MACFARLANE, THOMAS, F.R.S.C.
Representation and Taxation.
The Commonwealth, Ottawa I, 121.

MACFARLANE, THOMAS, F.R.S.C.
Salisbury's Imperialism.
The Commonwealth, Ottawa, I, 164.

MACFARLANE, THOMAS, F.R.S.C.
Wanted, An Imperial Budget.
The Commonwealth, Ottawa, I, 105.

MACGREGOR, J. G., LL.D., F.R.S.C.
His Life and Character. (Professor Charles Macdonald).
Dalhousie Gazette, Dalhousie University, Halifax, XXXIII, 246.

MACGREGOR, R. M., B.A.
Fitzgerald's "Omar Khayyam."
Dalhousie Gazette, Dalhousie University. Halifax, XXXIII, 198.

MACHAR, AGNES MAULE.
The Late J. A. Allan (Canadian Celebrities, No. XXIII).
Canadian Magazine, Toronto, XVII, 13.

MACKAY, A. H., LL.D.
Reminiscences of Charles Macdonald.
Dalhousie Gazette, Dalhousie University, Halifax, XXXIII, 256.

MACKAY, A. H., LL.D.
(Superintendent of Education for Nova Scotia). The Paired Fins of the Mackerel Shark. By Professor E. E. Prince and Dr. A. H. MacKay.
Contributions to Canadian Biology, 1901. (Supplement to the 32nd Annual Report of the Department of Marine and Fisheries, Ottawa), p. 55.

MACKAY, ISABELLA E.
A Sea-Song (verse).
Canadian Magazine, Toronto, XVI, 369.

MACKENZIE, SIR EDWARD, Baronet, N.S.
The Baronets of Nova Scotia; their Country and Cognizance. (Illustrated).
Transactions of the Royal Society of Canada, second series, Vol. VII, Part II, 87.

MACKENZIE, PROF. M. A., M.A. (Trinity University, Toronto).
The Trinity University Year-Book. Vol. 5.
The Carswell Co., Toronto, 1901.

MACKLEM, REV. T. C. STREET, M.A.
Centennial of the University of New Brunswick.
The University Monthly, University of New Brunswick, Fredericton, N.B., XX, 93.

MACLEAN, MISS ANNIE MARION, Ph.D.
The Acadian Element in the Population of Nova Scotia.
North American Notes and Queries, Quebec, I, 247, 265.

MACLEAN, REV. JOHN, M.A., Ph.D.
Better Lives for Common People.
William Briggs, Toronto, 8vo., 1901.

MACLEAN, REV. JOHN, M.A., Ph.D.
Blackfoot Amusements.
American Antiquarian, XXIII, 163-169.

Maclean, Rev. John, M.A., Ph.D.
The Making of a Christian.
William Briggs, Toronto, 8vo., 1901.

Maclennan, S. F., B.A.
The Needs of the University.
University of Toronto Monthly, I, 165.

Macleod, A. J.
The Notary of Grand Pré. A Historic Tale of Acadia.
Boston. *Published by the Author*, 1901, pp. 152.

Macleod, Fred. J.
The Diplomatic History of the Isthmian Canal.
Reprinted from *Year Book of Victorian Club*, Boston, 1901.
Pamphlet, 8vo., pp. 38.

Macleod, R. R.
Man and his Five Senses.
Acadia Athenæum, Acadia College, Wolfville, N.S., XXVIII, 95.

MacMechan, Archibald, Ph.D.
Carlyle's *Heroes, Hero-Worship and the Heroic in History*. Edited by Archibald MacMechan, Professor of English Language and Literature in Dalhousie College.
Ginn & Co., Boston, 1901, pp. 396.

MacMechan, Archibald, Ph.D.
Marabastad.
Dalhousie Gazette, Dalhousie University, Halifax, XXXIII, 154.

MacMechan, Archibald, Ph.D.
The Porter of Bagdad, and Other Fantasies.
George N. Morang & Co., Toronto, 1901, pp. 150.

MacMurchy, Archibald, M.A. (Editor of *The Canada Educational Monthly*, Toronto).
English at Trinity University.
Canada Educational Monthly, Toronto, XXIV, 391.

MacMurchy, Archibald, M.A.,
The Text-Book Problem.
Canada Educational Monthly, Toronto, XXIV, 348.

MacMurchy, Archibald, M.A.,
The War of the Future.
Canada Educational Monthly, Toronto, XXIV, 311. (Mr. MacMurchy is also responsible for a number of editorials in the *Canada Educational Monthly*).

MacMurchy, Helen, M.D. (Resident Medical Assistant, Toronto General Hospital).
Physiological Phenomena.
The Lancet, London, Oct. 5th, 1901.

MacMurchy, Helen, M.D.
School Hygiene.
Canada Educational Monthly, Toronto, XXIV, 399.

MacMurchy, Marjory.
Gaspe Sketches.
Canadian Magazine, Toronto, XVI, 335.

MacMurchy, Marjory.
Miss Jean McIlwraith. (Canadian Celebrities, No. XXIV).
Canadian Magazine, Toronto, XVII, 131.

MacMurchy, Marjory.
Tom Brown's School.
The Canada Educational Monthly, Toronto, XXIV, 378.

MacNaughton, Rev. John, M.A.
Paul's Gospel.
Queens Quarterly, Queens University, Kingston, VIII, 276.

MACOUN, JOHN, M.A., F.L.S., F.R.S.C.
The Opening up of Old Ontario.
The Commonwealth, Ottawa, I, 223.

MACOUN, JOHN, M.A., F.L.S., F.R.S.C.
The Wheatfields of the Canadian North-West.
The Commonwealth, Ottawa, I, 47.

MACOUN, W. T.
The planting of Shade Trees.
Rod and Gun in Canada, Montreal, II, 506.

MACPHERSON, W. E., B.A. (Gananoque, Ont.).
The Poetry of Matthew Arnold.
Ontario Educational Association, Transactions, Toronto, 139.

MACRAE, D., D.D.
In Memoriam Charles Macdonald.
Dalhousie Gazette, Dalhousie University, Halifax, N.S., XXXIII, 288.

MACVANE, S. M. (McLean Professor of Ancient and Modern History at Harvard University).
Some Phases of British Diplomacy.
Year-Book of Victorian Club, Boston, 1901.

MAGEE, KNOX.
Mark Everard.
McLeod & Allen, Toronto, 8vo., 1901, pp. 421.

MAGGS, REV. J. T. L., B.A., D.D.
The Modern British Pulpit.
Methodist Magazine and Review, Toronto, LIV, 439.

MAGURN, ARNOTT J.
The Canadian Parliamentary Guide.
Ottawa, 16mo., 1901.

MAGWOOD, MILLIE.
Pine Lake: A Story of Northern Ontario.
William Briggs, Toronto, 1901.

MAINER, R. HENRY.
The Dead Queen (verse).
Canadian Magazine, Toronto, XVI, 419.

MAIR, CHARLES.
Tecumseh, and Canadian Poems,
William Briggs, Toronto, 1901.

MANKS, HERBERT L.
Canada (verse).
Canadian Magazine, Toronto, XVII, 177.

MANLEY, H. B.
A Canadian in China.
Canadian Magazine, Toronto, XVII, 99.

MARSHALL, G. R. (Halifax, N.S.).
What the Teacher can do for the Farmer.
Dominion Educational Association, Addresses and Transactions, Ottawa, 99.

MARSHALL, JOHN.
Archibald Lampman.
Queens Quarterly, Queens University, Kingston, IV, 63.

MARTIN, CHESTER B.
Oliver Wendell Holmes.
The University Monthly, University of New Brunswick, Fredericton, N.B., XX, 86.

MARTIN, CHESTER B.
Development in the Plays of Shakespeare.
The University Monthly, University of New Brunswick, Fredericton, N.B., XXI, 2.

Martin, Martha.
Night. A Sonnet.
McGill Outlook, McGill University, III, 122.

Martin, Martha.
Song.
McGill Outlook, McGill University, IV, 65.

Massey, Walter E. H.
A Noble Life.
Methodist Magazine and Review, Toronto, LIV, 563.

Mattress, Major W.
Sick and Wounded in War, and How they are cared for.
Canadian Military Institute, Proceedings. Toronto, 1901.

Mavor, Prof. James.
Canadian Copyright.
University of Toronto Monthly, I, 139.

McAleer, Dr. George.
How Sabattis got his Christmas Dinner.
T. J. Hurley, Worcester, Mass., 8vo., 1901, pp. 7.

McAleer, Dr. George.
Reminiscent and Otherwise: Life in the Eastern Townships of the Province of Quebec, Canada, fifty years ago.
Lucius P. Goddard, Worcester, Mass., 1901, pp. 20.

McCall, Walter C.
Canadian Coins and Tokens. The Currency of Canada from the time of the French Regime.
Paper read before the *Norfolk County Historical Society*, Simcoe, Ont., February, 1901.

McCarthy, Patrick.
An Acadian Monarch.
Acadiensis, St. John, N.B., I, 163.

McConnell, Mrs. R. G.
The effect of the War of 1812 on Canada.
Women's Canadian Historical Society of Ottawa, Transactions, I, 177.

McCormac, George J.
John Pounds—Shoemaker and Philanthropist.
Prince Edward Island Magazine, Charlottetown, II, 380.

McCurdy, James Frederick, Ph.D., LL.D. (Professor of Oriental Languages in University College, Toronto).
History, Prophecy and the Monuments, or Israel and the Nations, in 3 vols.
The Macmillan Company, New York and London. (Vol. I, 1894; Vol. II, 1896). Vol. III, 1901.

McCurdy, James Frederick, Ph.D., LL.D.
Twenty-eight articles ("Aaron," "Abel," etc.) in Vol. I of *The Jewish Encyclopædia*.
Funk & Wagnalls, New York, 1901.

McDougall, Rev. John.
North-Western Canada.
Proceedings of the Royal Colonial Institute, London, XXXIII, 209-213.

McEvoy, Bernard.
Lawrence Alma-Tadema.
Methodist Magazine and Review, Toronto, LIV, 387.

McFadyen, John E., M.A., B.A. (Oxon.), Knox College, Toronto.
The Divine Pursuit.
The Westminster Company, Toronto, 1901.

McFadyen, John E., M.A., B.A. (Oxon.).
The Message of the Priestly and Prophetic Historians.
(In the series, *The Messages of the Books*).
Charles Scribners' Sons, New York, 1901.

McFadyen, John E., M.A., B.A. (Oxon.).
Review of Dr. McCurdy's *History, Prophecy and the Monuments.*
The University of Toronto Monthly, I, 67.

McGill, William.
Spec-Age (verse).
The Commonwealth, Ottawa, I, 148.

McGoun, Archibald, K.C.
An Imperial Parliament.
The Commonwealth, Ottawa, I, 161, 184.

McGrath, P. T.
The Anglo-French Question in Newfoundland.
Windsor Magazine, London, June, 1901.

McGrath, P. T.
Iron and Steel Making in Cape Breton.
Engineering Magazine, June, 1901.

McGrath, P. T.
The Railway Question in Newfoundland.
Canadian Magazine, Toronto, XVI, 329.

McHenry, K. V.
Canadian Art.
Brush & Pencil, Chicago, VIII, 331.

McIlwraith, Jean N.
The Curious Career of Roderick Campbell.
Houghton, Mifflin & Co., Boston, 8vo., 1901.

McInnes, T. R. E.
The Way of Beauty (verse).
Canadian Magazine, Toronto, XVII, 48.

McIntosh, A. (Toronto).
Evils of Extremes in the Professional Training of Teachers.
Ontario Educational Association, Transactions, Toronto, 405.

McIntyre, Charles H.
The New Canada.
Reprinted from *Year-Book of Victorian Club,* Boston, 1901.
Pamphlet, 8vo., pp. 13.

McIntyre, W. A., B.A. (Winnipeg).
Independent Individual Effort—Or the Upbuilding of Character.
Dominion Educational Association, Addresses and Transactions, Ottawa, 131.

McIntyre, W. A., B.A.
Selections in Poetical and Prose Literature. By John C. Saul and W. H. McIntyre, B.A.
Copp Clark Co., Toronto, 1901.

McKay, A.
Notes on some Subjects of the Provincial Examinations in Nova Scotia.
The Educational Review, St. John, N.B., XV, 60, 80.

McKay, K. M.
The Public Works and Utilities of Ontario Towns.
The Municipal World, St. Thomas, Ont., 1901.

McKellar, Archibald (Sheriff of the County of Wentworth, Ontario).
The old "Bragh," or Hand Mill.
Ontario Historical Society, Papers and Records, Toronto, III, 170.

McKenzie, A. E. G.
A Summer in New Ontario.
The University Monthly, University of New Brunswick, Fredericton, N.B., XXI, 64.

McKinnon, Hedley V.
War Sketches.
The Examiner Publishing Co., Charlottetown, P.E.I., 8vo., 1901.

McLachlan, R. W.
Two Canadian Golden Wedding Medals.
The Canadian Antiquarian and Numismatic Journal, Montreal, third series, Vol. III, p. 168.

McLean, S. J.
The Railway Policy of Canada, 1849-1867.
Journal of Political Economy, March-June, 1901, pp. 191-217.

McOuat, J. W.
Duties of an Inspector inside the School-room.
Dominion Educational Association, Addresses and Transactions, Ottawa, 320.

McTavish, Newton.
An Unposted Letter.
Canadian Magazine, Toronto, XVI, 367.

Meehan, J. A.
St. Patrick's failure, one and singular.
University of Ottawa Review, III, 528.

Mellish, Annie E.
Hon. David Farquharson. (Canadian Celebrities, No. XXV.)
Canadian Magazine, Toronto, XVII, 220.

Menge, George J.
The Social Problem.
McMaster University Monthly, Toronto, X, 255.

Meredith, Sir William Ralph.
The University and State Aid.
University of Toronto Monthly, I, 285.

Merrill, Helen M.
In the Wych-Wood (verse).
Acta Victoriana, Victoria University, Toronto, XXV, 160.

Mersereau, C. J.
Some practical results of philosophical speculations.
Acadia Athenæum, Acadia College, Wolfville, N.S., XXVIII, 147.

Mersereau, I. F.
Character.
The University Monthly, University of New Brunswick, Fredericton, N.B., XX, 90.

Middlemiss, Rev. James, D.D.
Christian instruction in the Public Schools of Ontario.
William Briggs, Toronto, 1901.

Millar, John, B.A.
Education for the Twentieth Century.
Methodist Magazine and Review, Toronto, LIII, 25.

Millar, John, B.A.
Educational Demands of Democracy.
Dominion Educational Association, Addresses and Transactions, Ottawa, 155.

Millar, John, B.A.
Public School System of Ontario.
Ontario Educational Association, Transactions, Toronto, 66.

Milligan, Rev. G. M., D.D.
The Book of Ecclesiastes.
Queens Quarterly, Queens University, Kingston, VIII, 314.

Milligan, Rev. G. M., D.D.
The place of Philosophy and Classics in Ministerial Education.
Acta Victoriana, Victoria University, Toronto, XXV, 174.

Mills, Hon. David, K.C.
The Unity of the British Empire: Its Helps and Hindrances, I.
The Empire Review, London, II, 1.

MILLS, HON. DAVID, K.C.
The Unity of the British Empire: Its Helps and Hindrances, II.
The Empire Review, London, II, 134.

MILLS, HON. DAVID, K.C.
The Monroe Doctrine and the Inter-Oceanic Canal, I.
The Empire Review, London, II, 403.

MILLS, HON. DAVID, K.C.
The Monroe Doctrine and the Inter-Oceanic Canal, II.
The Empire Review, London, II, 636.

MILLS, GEORGE H.
Historic value of Smith's Knoll.
Wentworth Historical Society, Journal and Transactions, Hamilton, III, 20.

MILLS, PROFESSOR.
Nature and Development of Animal Intelligence.
Montreal, 8vo., 1901.

MILNER, W. C.
LaValliere of Chignecto.
Acadiensis, St. John, N.B., I, 157, 213.

MITCHELL, ARCHIBALD.
A Problem in Forestry: Tree planting in the North-West.
Rod and Gun in Canada, Montreal, II, 529.

MOORE, SAMUEL, M.A.
The Queen.
The Canada Educational Monthly, Toronto, XXIV, 176.

MOORE, W. F. (Dundas, Ont.).
Public School Texts.
Ontario Educational Association, Transactions, Toronto, 352.

MORDEN, W. S.
The relation of Education to Morality.
Queens Quarterly, Queens University, Kingston, VIII, 340.

MORICE, REV. A. G., O.M.I.
Classification of the Dénés.
Transactions of the Canadian Institute, Toronto, Vol. VII, Part I, p. 28.

MORICE, REV. A. G., O.M.I.
Déné Surgery.
Transactions of the Canadian Institute, Toronto, Vol. VI, Part I, p. 15.

MORICE, REV. A. G., O.M.I.
Who are the Atnas?
American Antiquarian, XXIII, 307-312.

MORICE, MISS J. M.
The First Canadian Woman in the North-West; or, the story of Marie Anne Gaboury, wife of John Baptiste Lajimoniere, who arrived in the North-West in 1807, and died at St. Boniface at the age of 96 years. By M. l'Abbé G. Dugast. Translated by Miss J. M. Morice.
Historical and Scientific Society of Manitoba, Transaction No. 62, Winnipeg, 8vo., 1901, pp. 32.

MORRISON, LIEUT. EDWARD W. B.
With the Guns in South Africa.
Spectator Printing Co., Hamilton, 8vo., 1901.

MORRISON, F. A., LL.B.
A Night with Smugglers.
Dalhousie Gazette, Dalhousie University, Halifax, N.S., XXXIII, 220.

MORSE, CHARLES, D.C.L.
An Immortal Work. (Review of new edition of Gibbon.)
The Commonwealth, Ottawa, I, 52.

MORSE, CHARLES, D.C.L.
Legal Maxims.
American Law Review, St. Louis, Mo., XXXV, 529.

Morse, Charles, D.C.L.
A Modern Eloisa.
The Commonwealth, Ottawa, I. 33.

Morse, Charles, D.C.L.
A Plea for a "Higher" Criticism.
The Commonwealth, Ottawa, I, 7.

Morse, Charles, D.C.L.
Review of Prof. Wm. Graham's *English Political Philosophy from Hobbes to Maine.*
The Commonwealth, Ottawa, I, 34.

Morse, Charles, D.C.L.
Review of Mrs. Humphrew Ward's *Eleanor.*
The Commonwealth, Ottawa, I, 16.

Morse, Inglis.
Man (verse).
Canadian Magazine, Toronto, XVII, 536.

Morse, Rev. R. Osgood, M.A.
Personal Education as shown in the work of Thomas Arnold.
Acadia Athenæum, Acadia College, Wolfville, N.S., XXVIII, 4.

Morton, Irene Elder.
The Grave of the Year (verse).
Acadia Athenæum, Acadia College, Wolfville, N.S., XXVIII, 94.

Moss, C. A., B.A.
Zeta Psi at Toronto.
University of Toronto Monthly, I, 174.

Mowat, J. Gordon.
The Purpose of a National Magazine.
Canadian Magazine, Toronto, XVII, 166.

Mowat, J. Gordon.
Where Summers are Long.
The Canada Educational Monthly, Toronto, XXIV, 369.

Mowat, Sir Oliver, K.C.M.G., LL.D.
Christianity and Some of its Evidences. 2nd Edition, Revised and Enlarged.
William Briggs, Toronto, 1901.

Mueller, Rev. P. W. (Toronto).
Sprachkenntnisse Als Mittel Zur Geistesbildung.
Ontario Educational Association, Transactions, Toronto, 149.

Muldrew, W. H., B.A., D.Paed. (Gravenhurst, Ont.).
Sylvan Ontario: A Guide to our Native Trees and Shrubs.
Copyright, 10th June, 1901.

Munro, W. Bennett.
The German Reichstag—A Study in Comparative Politics.
Queens Quarterly, Queens University, Kingston, IX, 1.

Murison, Ross G., M.A., B.D. (University of Toronto).
Babylonia and Assyria, a Sketch of their History.
T. & T. Clark, Edinburgh, 1901.

Murison, Ross G., M.A., B.D.
Totemism in the Old Testament.
The Biblical World, University of Chicago, September, 1901.

Murray, Prof. D. A., Ph.D.
Mathematics for Undergraduates.
Dalhousie Gazette, Dalhousie University, Halifax, XXXIV, 9-20, 38-45.

Murray, Prof. D. A., Ph.D.
Prof. Charles Macdonald.
Dalhousie Gazette, Dalhousie University, Halifax, N.S., XXXIII. 272

Murray, Prof. J. Clark, LL.D., F.R.S.C.
Introduction to *The Library of Oratory, Ancient and Modern.*
Globe Publishing Co., London and New York, 1901.

MURRAY, PROF. J. CLARK, LL.D., F.R.S.C.
Review of Professor Cappon's *Britain's Title in South Africa.*
The Scottish American, New York, Nov. 13th, 1901.

MURRAY, PROF. J. CLARK, LL.D., F.R.S.C.
Review of Rev. Dr. McCrie's *The Church of Scotland; Her Divisions and Reunions.*
The Scottish American, New York, May 29th, 1901.

MURRAY, PROF. J. CLARK, LL.D., F.R.S.C.
Review of Principal Salmond's *Christian Doctrine of Immortality.*
The International Journal of Ethics, April, 1901.

MURRAY, MRS. J. CLARK.
Patriotism in Schools.
Dominion Educational Association, Addresses and Transactions, Ottawa, 57.

MURRAY, PROF. W. C., M.A.
The City and the College.
Dalhousie Gazette, Dalhousie University, Halifax, XXXIV, 65.

MURRAY, PROF. W. C., M.A.
Dalhousie's New Professors.
Dalhousie Gazette, Dalhousie University, Halifax, XXXIV, 3.

MURRAY, PROF. W. C., M.A.
University Consolidation.
Dalhousie Gazette, Dalhousie University, Halifax, XXXIV, 94.

N., J.
Memories of Old St. James.
Prince Edward Island Magazine, Charlottetown, II, 339.

NASH, C. W.
The Bass of Ontario.
Canadian Magazine, Toronto, XVII, 333.

NEELY, DENTON J.
Oratory.
Acadia Athenæum, Acadia College, Wolfville, N.S., XXVIII, 317.

NEWCOMB, REV. A. F., M.A.
The Destruction of Jerusalem in A.D. 70.
Acadia Athenæum, Acadia College, Wolfville, N.S., XXVIII, 187.

NEWELL, REV. J. R.
A Patriotic Song.
The Commonwealth, Ottawa, I, 129.

NICHOLSON, BYRON.
Attractions of Quebec.
Canadian Magazine, Toronto, XVI, 554.

NORTHWOOD, MARGARET A.
Early Immigration into Upper Canada.
Women's Canadian Historical Society of Ottawa, Transactions, I, 151.

NORTON, JACQUELINE M.
Madame de Stael-Holstein.
McMaster University Monthly, Toronto, X, 269.

OAKELEY, H. D.
Relations between States.
McGill Outlook, McGill University, Montreal, III, 150, 164, 173.

O'BRIEN, J.
Field Notes from the North-West.
Prince Edward Island Magazine, Charlottetown, II, 383.

O'CONNOR, DANIEL.
Diaries and Memoirs of the late D. O'Connor, one of the Pioneers of Bytown.
Privately printed, Ottawa, 4to., 1901.

O'HAGAN, THOMAS, M.A., Ph.D.
Canadian Essays: Critical and Historical.
William Briggs, Toronto, 1901.

O'HAGAN, THOMAS.
French-Canadian Life and Literature.
Catholic World, LXXII, 628.

OSBORNE, A. C.
The Migration of *Voyageurs* from Drummond Island to Penetanguishene, in 1828.
Ontario Historical Society, Papers and Records, Toronto, III, 123.

OSBORNE, PROF. W. F., M.A.
The Wayside Inn at Sudbury.
The Commonwealth, Ottawa, I, 187.

OSBORNE, PROF. W. F., M.A.
The American University as a National Factor.
Vox Wesleyana, Wesley College, Winnipeg, VI, 29.

OSLER, PROF. WM., M.D., F.R.S. (Johns Hopkins University).
Books and Men, an Address delivered at the opening of the Boston Medical Library.
Boston Medical and Surgical Journal, January, 1901.

OSLER, PROF. WM., M.D., F.R.S.
Principles and Practice of Medicine. (4th Edition.)
London and New York, 1901.

OSLER, PROF. WM., M.D., F.R.S.
Progress of Medicine in the Nineteenth Century. ("Science in the Nineteenth Century.")
Harper Brothers, New York, 1901.

OULTON, M. A.
In the Wilds of New Brunswick.
The University Monthly, University of New Brunswick, Fredericton, N.B., XX, 124.

OWEN, ISABELLA A.
Elizabeth Charlotte. A forgotten authoress.
Acadiensis, St. John, N.B., I, 228.

OXLEY, J. MACDONALD.
A Boy of the Banks.
The King's Own, Toronto, May, June, July, 1901.

OXLEY, J. MACDONALD.
Christmas Games in French Canada.
Canadian Magazine, Toronto, XVIII, 117.

OXLEY, J. MACDONALD.
The City of Logs and Laws.
The King's Own, Toronto, June, 1901.

OXLEY, J. MACDONALD.
The Gratitude of Ugly Mug.
The Canadian Boy, Toronto, October, 1901.

OXLEY, J. MACDONALD.
Goldwin Smith at the Grange.
New York Times Saturday Review, Oct. 12th, 1901.

OXLEY, J. MACDONALD.
In the Land of the Lamas.
The Westminster, Toronto, September, 1901.

OXLEY, J. MACDONALD.
In Peril on the Sea.
The King's Own, Toronto, March, 1901.

OXLEY, J. MACDONALD.
Norman's Nugget.
Partridge & Co., London, 8vo., 1901, pp. 297.

OXLEY, J. MACDONALD.
North Overland with Franklin.
Religious Tract Society, London, 1901, pp. 256.

OXLEY, J. MACDONALD.
A Note on Genius.
New York Times Saturday Review, March 2nd, 1901.

OXLEY, J. MACDONALD.
Ottawa, the Capital.
New England Magazine, Boston, April, 1901.

OXLEY, J. MACDONALD.
Our Amateur Burglary.
The Canadian Boy, Toronto, August, 1901.

OXLEY, J. MACDONALD.
Who's Hatch.
Boy's Own Paper, London, May, 1901.

P., C. B.
A Peep at the Other Half.
McMaster University Monthly, Toronto, X, 295.

P., W.
A Nicotine Ballad (verse).
Prince Edward Island Magazine, Charlottetown, II, 350.

PACKHAM, JAMES H., B.A. (Owen Sound, Ont.).
Interest.
Ontario Educational Association, Transactions, Toronto, 328.

PAGE, R. B., B.A. (Toronto Junction, Ont.).
Life and Times of Chaucer.
Ontario Educational Association, Transactions, Toronto, 173.

PAKENHAM, W., B.A. (Toronto).
Higher Elementary Phase of Secondary Education in England.
Dominion Educational Association, Addresses and Transactions, Ottawa, 260.

PAPINEAU, TALBOT M.
To Hudson's Bay in Canoes.
McGill Outlook, McGill University, Montreal, IV, 50, 64.

PARKER, SIR GILBERT, D.C.L., M.P.
The March of the White Guard.
R. F. Fenno & Co., New York, 1901.

PARKER, SIR GILBERT, D.C.L., M.P.
The Right of Way. A Novel. Illustrated by A. I. Keller.
(First published as a serial in *Harper's Magazine*, Jan. to July, 1901).
Toronto, *Copp Clark Co.*, 12mo., 1901, pp. 419.

PARKER, JOHN, B.A. (Inspector of Schools, Leeds, P.Q.).
Duties of a School Inspector outside the School-Room.
Dominion Educational Association, Addresses and Transactions, Ottawa, 314.

PARKIN, GEORGE R., D.C.L., C.M.G.
Victoria and the Victorian Age.
Canadian Magazine, Toronto, XVI, 395.

PARKINSON, AMY.
At Yuletide (verse).
Methodist Magazine and Review, Toronto, LIV, 522.

PARKINSON, AMY.
Enoch (verse).
Methodist Magazine and Review, Toronto, LIV, 442.

PARKINSON, AMY.
A Glad New Year (verse).
Methodist Magazine and Review, Toronto, LIII, 140.

PARKINSON, AMY.
God Shall Supply All our Need (verse).
Methodist Magazine and Review, Toronto, LIII, 535, LIV, 176.

PARKINSON, AMY.
His Great Love (verse).
Methodist Magazine and Review, Toronto, LIV, 58.

PARKINSON, AMY.
In the Morning (verse).
Methodist Magazine and Review, Toronto, LIII, 357.

PARKINSON, AMY.
The Lord is thy Keeper (verse).
Methodist Magazine and Review, Toronto, LIII, 275.

PARKINSON, AMY.
The Song in the Night (verse).
Methodist Magazine and Review, Toronto, LIV, 458.

PARTRIDGE, REV. DR.
Has Man Three Brains.
The University Monthly, University of New Brunswick, Fredericton, XX, 145.

PATERSON, JOHN A., M.A.
The University Act, 1901.
University of Toronto Monthly, I, 268.

PATRICK, J. N., A.M.
Method.
The Canada Educational Monthly, Toronto, XXIV, 63.

PATTERSON, J. W.
Economics of Trades Unions *vs.* Orthodox Economics.
The Commonwealth, Ottawa, I, 32.

PATTERSON, NORMAN.
Aftermath of the Royal Visit.
Canadian Magazine, Toronto, XVIII, 133.

PATTERSON, NORMAN.
Canadian Imperialism in England.
Canadian Magazine, Toronto, XVII, 331.

PATTERSON, NORMAN.
Historical Publications.
Canadian Magazine, Toronto, XVII, 66.

PATTERSON, NORMAN.
A National Mint.
Canadian Magazine, Toronto, XVI, 209.

PATTERSON, NORMAN.
The New King.
Canadian Magazine, Toronto, XVI, 414.

PATTERSON, NORMAN.
The Passing of the Contingents.
Canadian Magazine, Toronto, XVI, 299.

PATTERSON, NORMAN.
The Royal Train.
Canadian Magazine, Toronto, XVII, 537.

PATTERSON, NORMAN.
Touring a Continent.
Canadian Magazine, Toronto, XVIII, 7.

PATTERSON, MRS. SARA BARRY (Truro, N.S.).
Christmas Talks and Stories.
The Educational Review, St. John, N.B., XV, 130.

PATTERSON, MRS. SARA BARRY.
Color Lessons.
The Educational Review, St. John, N.B., XIV, 243.

PATTERSON, MRS. SARA BARRY.
June Studies for Little Folks.
The Educational Review, St. John, N.B., XV, 11.

PATTERSON, MRS. SARA BARRY.
Kindergarten and Primary Course.
The Educational Review, St. John, N.B., XIV, 169, 199.

PATTERSON, MRS. SARA BARRY.
Primary Lessons.
The Educational Review, St. John, N.B., XIV, 219, XV, 62.

PATTERSON, MRS. SARA BARRY.
Talks for Primary Grades.
The Educational Review, St. John, N.B., XV, 108.

PATTISON, MAJOR W. MEAD.
Paper read before The Historical Society of the County of Brome, at Isle aux Noil, on the 8th August, 1901, by Major W. Mead Pattison, of Clarenceville, P.Q. (Embodying the result of researches into the history of Isle aux Noix.)
Transactions of the Brome County Historical Society, I, 46.

PATTULLO, G. R., JR.
Ha-Hin, Chinaman.
The Canadian Magazine, Toronto, XVI, 361.

PEACE, ROBERT.
Incompleteness.
Prince Edward Island Magazine, Charlottetown, II, 352.

PECK, HARCOURT W.
The Hawaiian Pantheon.
Acta Victoriana, Victoria University, Toronto, XXIV, 292.

PENNINGTON, AMY KINGSLAND.
The Response (verse).
Canadian Magazine, Toronto, XVI, 156.

PENSE, E. J. B.
The Making of a Bishop.
Canadian Magazine, Toronto, XVI, 228.

PEPPER, M. S.
Maids and Matrons of Canada.
The Chatauquan, XXXII, 381.

PERRY, S. W., B.A. (Kincardine, Ont.).
Elementary Instruction in Latin.
Ontario Educational Association, Transactions, Toronto, 252.

PETERSON, W., M.A., LL.D. (Principal, McGill University).
Address on the Death of the Queen.
McGill Outlook, McGill University, Montreal, III, 127.

PETITT, MAUDE, B.A.
Across the Barrier of Years.
Canadian Magazine, Toronto, XVII, 467.

PETITT, MAUDE, B.A.
By Western Watch-Fires.
Methodist Magazine and Review, Toronto, LIII, 263.

PETITT, MAUDE, B.A.
A Crushed Flower.
Methodist Magazine and Review, Toronto, LIV, 364.

PETITT, MAUDE, B.A.
A Mast-head Light in the Storm.
Methodist Magazine and Review, Toronto, LIII, 71.

PETITT, MAUDE, B.A.
Nought but Sleep (verse).
Methodist Magazine and Review, Toronto, LIV, 419.

PETITT, MAUDE, B.A.
On the Bluff by the Sea.
Methodist Magazine and Review, Toronto, LIII, 545.

PETITT, MAUDE, B.A.
Rumblings of Revolution.
Methodist Magazine and Review, Toronto, LIV, 138.

PETRY, H. J. H.
Pleonasm in the Prayer Book.
The Commonwealth, Ottawa, I, 54.

PHILLIPPS-WOLLEY, CLIVE (Captain).
The Chicamon Stone.
Bell's Indian and Colonial Library, London and Bombay, 8vo., 1901.

PHILLIPPS-WOLLEY, CLIVE (Captain).
The Mongolian Question.
The Commonwealth, Ottawa, I, 83.

PIGEON, MADAME.
Mlle. Mance and the Early Days of Hôtel Dieu of Ville-Marie, 1634-1656.
Women's Canadian Historical Society of Ottawa, Transactions, I, 116.

PLANT, VERNER LOVELACE.
Alone (verse).
McGill Outlook, McGill University, Montreal, IV, 65.

PLANT, VERNER LOVELACE.
The Viking's Vision.
McGill Outlook, McGill University, Montreal, III, 178.

PORTER, REV. T. W., M.A.
Stability and Progress.
Acadia Athenæum, Acadia College, Wolfville, N.S., XXVIII, 281.

PORTLOCK, MRS. ROSA.
Twenty-Five Years of Canadian Life.
William Briggs, Toronto, 1901.

POWELL, M. E.
Love Life of Mrs. Browning.
Acta Victoriana, Victoria University, Toronto, 1901.

POWELL, NONIE.
The Birthplace of Napoleon.
Canadian Magazine, Toronto, XVII, 303.

PRESTON, SYDNEY HERMAN.
The Abandoned Farmer.
Chas. Scribners & Sons, New York.
The Copp Clark Company, Toronto, 1901, pp. 288.

PRINCE, PROFESSOR EDWARD E., F.R.S. (Dominion Commissioner of Fisheries).
Account of the Marine Biological Station of Canada.
Contributions to Canadian Biology, 1901. (Supplement to the 32nd Annual Report of the Department of Marine and Fisheries). p. 1.

PRINCE, PROFESSOR EDWARD E., F.R.S.
The Aim and Method of Fishery Legislation.
Supplement No. I to the 34th Annual Report of the Department of Marine and Fisheries, p. 20.

PRINCE, PROFESSOR EDWARD E., F.R.S.
The Hatching and Planting of Trout.
Supplement No. 1 to the 34th Annual Report of the Department of Marine and Fisheries, Ottawa, p. 1.

PRINCE, PROFESSOR EDWARD E., F.R.S.
The Paired Fins of the Mackerel Shark. By Professor E. E. Prince, Dominion Commissioner of Fisheries, and Dr. A. H. MacKay, Superintendent of Education for Nova Scotia.
Contributions to Canadian Biology, 1901, p. 55.

PRINCE, PROFESSOR EDWARD E., F.R.S.
The Planting of Predaceous Fish.
Supplement No. 1 to the 34th Annual Report of the Department of Marine and Fisheries, Ottawa, p. 7.

PUGSLEY, EDMUND.
Peter Klengersmith, or White Peter.
Paper read before the *Norfolk County Historical Society,* Simcoe, Ont., in March, 1901.

RAGG, ALBAN E.
Memories (verse).
Canadian Magazine, Toronto, XVII, 253.

RAGG, ALBAN E.
To Count Tolstoi (verse).
Canadian Magazine, Toronto, XVII, 44.

RAND, EDITH H.
The True End of Education.
Acadia Athenæum, Acadia College, Wolfville, N.S., XXVIII, 321.

RAYMOND, REV. W. O., M.A.
The Comic Element in *Henry V.*
The University Monthly, University of New Brunswick, Fredericton, XX, 146.

RAYMOND, REV. W. O., M.A.
The Genesis of the University of New Brunswick.
The University Monthly, University of New Brunswick, XX, 151.

RAYMOND, REV. W. O., M.A.
Incidents in the Early History of St. John.
Acadiensis, St. John, N.B., I, 82, 151.

RAYMOND, REV. W. O., M.A.
The Pathos in Chaucer.
The University Monthly, University of New Brunswick, Fredericton, XXI, 70.

RAYMOND, REV. W. O., M.A.
The Winslow Papers, A.D. 1776-1826. Edited by Rev. W. O. Raymond, M.A.
Printed under the auspices of the *New Brunswick Historical Society.*
The Sun Printing Co., St. John, N.B., 1901, pp. 732.

READ, EVA.
Early Days of Ottawa.
Women's Canadian Historical Society of Ottawa, Transactions, I, 44.

READE, JOHN, F.R.S.C.
Half a Century's Progress.
Canadian Magazine, Toronto, XVI, 264, 319, 540.

REID, R. A., LL.B.
The Rights of Witnesses.
Dalhousie Gazette, Dalhousie University, Halifax, XXXIII, 113.

RENAULT, RAOUL.
Thomas Jefferson and the Loyal and Patriotic Society of Upper Canada.
North American Notes and Queries, Quebec, I, 201, 233.

REYNAR, A. H., M.A., LL.D. (*and* **CLARKSON, C., B.A.**).
Annotated Edition of Scott's *Lay of the Last Minstrel.*
Toronto, *W. J. Gage & Co.,* 1901.

RHEAUME, MME.
Battle of Chrysler's Farm.
Women's Canadian Historical Society of Ottawa, Transactions, I, 183.

RICHARD, EDOUARD.
Supplement to Dr. Brymner' *Report on Canadian Archives.*
Ottawa, *S. E. Dawson,* Queen's Printer, 1901.

RICHARDSON, R. L. (Winnipeg).
Party Government.
The Commonwealth, Ottawa, I, 142.

RIDDELL, PROF. J. H.
The German Schools.
Vox Wesleyana, Wesley College, Winnipeg, V, 89.

Riddell, Prof. J. H.
Looking Ahead in Matters Educational.
Vox Wesleyana, Wesley College, Winnipeg, V, 124.

Risteen, Frank H.
How to Build a Trapper's Camp.
Rod and Gun in Canada, Montreal, II, 493.

Roberts, Charles G. D., F.R.S.L., etc.
The Deserted Wharf (verse).
Acta Victoriana, Victoria University, Toronto, XXV, [illegible]18.

Roberts, Charles G. D.
In the Orchard (verse).
Acta Victoriana, Victoria University, Toronto, October, 1901.

Roberts, Charles G. D.
Life and Art (verse).
Acta Victoriana, Victoria University, Toronto, XXV, 133.

Roberts, Charles G. D.
Poems.
New York, *Silver, Burdette & Co.*
Toronto, *The Copp Clark Co.*, 8vo., 1901, pp. 222.

Roberts, Charles G. D.
Pipers of the Pool (verse).
Lippincott's Magazine, Philadelphia, LXVII, 491.

Roberts, Charles G. D.
Rose of Life (verse).
Century, New York, LXI, 868.

Roberts, Charles G. D.
Wild Motherland.
Canadian Magazine, Toronto, XVII, 134.
Outing, New York, February, 1901.

Roberts, Charles G. D.
Wisdom of Love (verse).
Munsey's Magazine, New York, XXVI, 290.

Roberts, Theodore.
Mother Carey's Chickens (verse).
The Independent, New York, LIII, 2532.

Roberts, Theodore.
Sailing North (verse).
The Independent, New York, LIII, 1360.

Roberts, Theodore.
Sir Ector to the Dead Knight (verse).
The Independent, New York, LIII, 559.

Robertson, J. C., B.A. (Toronto).
One Phase of the Mission of Greece.
Ontario Educational Association, Proceedings, Toronto, 259.

Robertson, J. C., B.A.
Words of Counsel.
Acta Victoriana, Victoria University, Toronto, XXV, 110.

Robertson, Prof. James W.
Manual Training.
Ontario Educational Association, Transactions, Toronto, 85.

Robertson, Prof. James W.
Manual Training Schools.
Canadian Magazine, Toronto, XVI, 521.

Robertson, Prof. James W.
Rural Schools in Canada.
Dominion Educational Association, Addresses and Transactions, Ottawa, 84.

Robertson, M. S., B.A.
The Teaching of Modern Languages.
The Canada Educational Monthly, Toronto, XXIV, 179.

ROBERTSON, W. F., LL.B.
Public School History—
Of England. By W. F. Robertson, LL.B.
Of Canada. By G. U. Hay, D.Sc.
Toronto, *The Copp Clark Co.*
St. John, N.B., *J. & A. McMillan*, 1901, pp. 289.

ROBERTSON, W. J., B.A., LL.B. (St. Catharines, Ont.).
The Bible in the Schools.
Ontario Educational Association, Transactions, Toronto, 114.

ROBERTSON, W. J., B.A., LL.B.
Modification of the High School System of Ontario, demanded by the Needs of the Time.
Dominion Educational Association, Addresses and Transactions, Ottawa, 148.

ROBINS, S.P., LL.D. (Principal, McGill Normal School, Montreal).
Desirability of Dominion Registration of Trained Teachers.
Dominion Educational Association, Addresses and Transactions, Ottawa, 53.

ROBINSON, E.
English Literature in the Lower Grades.
The Educational Review, St. John, N.B., XIV, 274; XV, 107.

ROBINSON, JESSIE.
The Empire's Call; or, The Line that Belts the World (verse).
Privately Printed, Toronto, 1901.

ROBINSON, PERCY J., B.A. (Toronto).
Sophocles.
Ontario Educational Association, Proceedings, Toronto, 269.

ROBSON, ALMA.
The Little Shop at the Corner.
Canadian Magazine, Toronto, XVIII, 71.

ROGERS, AMY.
A Tribute (verse).
Canadian Magazine, Toronto, XVI, 419.

ROGERS, CHARLES GORDON.
Man (verse).
Canadian Magazine, Toronto, XVII, 88.

ROGERS, CHARLES GORDON.
Medea of the Studio.
The Sun, New York, 1901.

ROGERS, R. VASHON, B.A., LL.D.
The Devil in Law.
The Green Bag, Boston, 1901.

ROGERS, R. VASHON, B.A., LL.D.
The Legal Position of Women in China.
The Green Bag, Boston, 1901.

ROGERS, R. VASHON, B.A., LL.D.
Women among Mahommedans.
The Green Bag, Boston, 1901.

ROGERS, W. W.
An Islander's Christmas Dinner in Greenwood, B.C.
Prince Edward Island Magazine, Charlottetown, II, 369.

ROGERS, W. W.
The Pioneers (verse).
Prince Edward Island Magazine, Charlottetown, II, 299.

ROSE, REV. S. P., D.D.
A Plea for a Neglected Duty.
Methodist Magazine and Review, Toronto, LIII, 536.

Rose-Holden, Mrs. J.
Historical Data re State and Church in Wentworth County, Ontario.
1. The State.
2. The Church.
Wentworth Historical Society, Journal and Transactions, Hamilton, Ont., III, 45, 55.

Rose-Holden, Mrs. J.
Relic of Thayendanegea. (Captain Joseph Brant.)
Ontario Historical Society, Papers and Records, Toronto, III, 113.

Ross, A. E.
A Communication from Camp Rustenburg.
Queen's College Journal, Kingston, XXVIII, 161.

Ross, A. E.
Sketches from South Africa.
Queen's College Journal, Kingston, XXIX, 35.

Ross, Mrs. Anna (Ottawa).
The New Covenant. A Lost Secret.
Toronto, *William Briggs*, 1901, pp. 193.

Ross, Hon. George W.
The growth of the British Empire.
Canadian Magazine, Toronto, XVI, 423.

Ross, Hendry Durie.
An American's Sentiment Towards the British.
The Commonwealth, Ottawa, I, 174.

Ross, Hendry Durie.
On Imperialism.
The Commonwealth, Ottawa, I, 224.

Ross, Rev. James, D.D.
The infallibility of Christ's Teaching.
Presbyterian College Journal, Montreal, 1901.

Ross, Miss Mary S., M.A.
In Hawaii.
Dalhousie Gazette, Dalhousie University, Halifax, XXXIV, 34, 69.

Ross, Norman M.
Comparison between European and Canadian Forest Conditions.
Rod and Gun in Canada, Montreal, II, 528.

Rothwell, B. E., B.A.
The Women of the *Idylls of the King.*
Vox Wesleyana, Wesley College, Winnipeg, VI, 48.

Rudolf, R. D., M.D., M.R.C.P.
Observations on Blood Pressure.
Transactions of the Canadian Institute, Toronto, Vol. VI, Part I, p. 187.

Ruthven, Ed.
The Session of 1901. (Canadian Parliament.)
The Commonwealth, Ottawa I, 102.

Ruthven, Ed.
What about our Forests?
The Commonwealth, Ottawa, I, 209.

S., J.
The 100 Deer Hunt.
Rod and Gun in Canada, Montreal, II, 418.

S., J.
A Trip to Glen Gordon.
Rod and Gun in Canada, Montreal, II, 443.

S., W. F. P.
Misquotations.
The Educational Review, St. John, N.B., XV, 8.

S. W. F. P.
The Real Shakespeare.
The Educational Review, St. John, N.B., XV, 129.

SALT, SILAS.
If Meat Offend (verse).
Methodist Magazine and Review, Toronto, LIV, 319.

SALZSCHEIDER MRS. A.
Pandora: A Novel.
San Francisco, *The Whitaker & Ray Co.*, 1901.

SANDERCOCK, W. C.
Nature Study.
Educational Journal of Western Canada, Winnipeg, III, 74.

SANDERSON, REV. J. E.
Messengers of the Churches. Series Two.
Toronto, *William Briggs*, 1901.

SANDS, HAROLD.
Qualichin and the Cultus Trader.
Canadian Magazine, Toronto, XVIII, 179.

SAUL, JOHN C
Selections in Poetical and Prose Literature. By John C. Saul and W. A. McIntyre, B.A.
Toronto, *Copp Clark Co.*, 1901.

SAUNDERS, MISS LOIS.
Dante's Conception of Evil.
Queens Quarterly, Queens University, Kingston, VIII, 161.

SAUNDERS, MISS LOIS.
Queen's University—A Historical Sketch.
Queens College Journal, Kingston, Nov., 1901.

SAUNDERS, MISS MARSHALL.
'Tilda Jane: An Orphan in Search of a Home.
Boston, *L. C. Page & Co.*
Toronto, *William Briggs.* Illustrated 12mo., 1901, pp. 287. (First published as a serial in the *Youth's Companion*, Boston, 1901).

SAWTELL, R. W.
The Author of *Lorna Doone.*
McMaster University Monthly, Toronto, X, 242.

SAWTELL, R. W.
Browsings from an Old Pasture.
Paper read before the *Oxford Historical Society*, Woodstock, Ont., 22nd January, 1901.

SAWTELL, R. W.
Visit of King Edward to Woodstock.
Paper read before the *Oxford Historical Society*, Woodstock, Ont., 21st February, 1901.

SAWYER, REV. A. W., D.D., LL.D. (Professor of Psychology and Metaphysics, Acadia University).
Education of Women in Nova Scotia and New Brunswick. An Historical Sketch.
Windsor, N.S., *J. J. Anslow*, 1901, pp. 30.

SCOTT, PROF. A. M., Ph.D.
Michael Faraday.
The University Monthly, University of New Brunswick, Fredericton, N.B., XX, 142.

SCOTT, DUNCAN CAMPBELL, F.R.S.C.
An Adventure of Mrs. McKenzie.
Ainslie's Magazine, New York, August, 1901.

SCOTT, DUNCAN CAMPBELL, F.R.S.C.
The Coming of Winter (verse).
Munsey's Magazine, New York, XXVI, 362.

SCOTT, DUNCAN CAMPBELL, F.R.S.C.
Coquelicot.
Globe, (Christmas Number), Toronto, Dec., 1901.

SCOTT, DUNCAN CAMPBELL, F.R.S.C.
A Decade of Canadian Poetry.
Canadian Magazine, Toronto, XVII, 153.

SCOTT, DUNCAN CAMPBELL, F.R.S.C.
Love Song (verse).
The Independent, New York, LIII, 2775.

SCOTT, DUNCAN CAMPBELL, F.R.S.C.
Love Song (verse).
The Delineator, New York, 1901.

S., D. C. (SCOTT, DUNCAN CAMPBELL).
Review of J. S. Thomson's *A Day's Song*.
Canadian Magazine, Toronto, XVI, 271.

SCOTT, DUNCAN CAMPBELL, F.R.S.C.
The Sea by the Wood (verse).
Canadian Magazine, Toronto, XVIII, 142.

SCOTT, DUNCAN CAMPBELL, F.R.S.C.
Twin Flowers on the Portage (verse).
Atlantic Monthly, Boston, LXXXVIII, 137.

SCOTT, DUNCAN CAMPBELL, F.R.S.C.
Welcome to the Duke of Cornwall and York (verse).
Star, (Special Welcome Number), Montreal, 1901.

SCOTT, DR. F. H. (University of Toronto).
The Food of the Sea Urchin. (Strongylocentrotus.)
Contributions to Canadian Biology, 1901. (Supplement to the 32nd Annual Report of the Department of Marine and Fisheries, Ottawa), p. 49.

SCOTT, H. GEORGIE.
The Characterization of George Eliot in *Middlemarsh*.
Acadia Athenæum, Acadia College, Wolfville, N.S., XXVIII, 163.

SCOTT, MARY MCKAY.
A Hero of Fifty Years Ago.
Women's Canadian Historical Society of Ottawa, Transactions, I, 42.

SCOTT, M. O.
Douglas Brymner, Archivist. (Canadian Celebrities, No. XIX.)
Canadian Magazine, Ottawa, XVI, 206.

SCOTT, WILLIAM, B.A. (Principal, Normal School, Toronto).
The Bible in Public Schools.
The Canada Educational Monthly, Toronto, XXIV, 41.

SCOTT, WILLIAM, B.A.
What Child Study has done for Education.
The Canada Educational Monthly, Toronto, XXIV, 346.

SCOTT, WILLIAM, B.A.
What Child Study has done for the Teaching World.
Dominion Educational Association, Addresses and Transactions, Ottawa, 282.

SCRIMGER, REV. JOHN, D.D.
Ethical Development of Christianity. (Five Articles.)
Presbyterian College Journal, Montreal, 1901.

SCRIMGER, REV. JOHN, D.D.
The Revision of the Confession.
Presbyterian College Journal, Montreal, 1901.

SCRIMGER, REV. JOHN, D.D.
The Doctrine of the Holy Spirit. (Two Articles.)
Presbyterian College Journal, Montreal, 1901.

SEARS, GEORGE EDWARD.
The Origin of the New York *Herald*.
Acadiensis, St. John, N.B., I, 254.

SEDGEWICK, REV. W. H., B.A.
The Victory of Peace.
Dalhousie Gazette, Dalhousie University, Halifax, N.S., XXXIV, 91.

SEETON, MISS ELLA.
Robert Louis Stevenson.
Dalhousie Gazette, Dalhousie University, Halifax, N.S., XXXIV, 102.

SELWYN, CECIL E.
Toast to the King (verse).
Canadian Magazine, Toronto, XVII, 282.

SEMPLE, JESSIE P.
Art Education.
Educational Journal of Western Canada, Winnipeg, III, 229.

SETON-THOMPSON, ERNEST. (*See* THOMPSON-SETON, ERNEST.)

SEYMOUR, REV. JAMES COOKE.
The Romance of the Savings Bank.
Methodist Magazine and Review, Toronto, LIV, 499.

SEYMOUR, REV. JAMES COOKE.
The Romance of the Post Office.
Methodist Magazine and Review, Toronto, LIII, 245.

SEYMOUR, REV. JAMES COOKE.
Wealth and its Uses.
Methodist Magazine and Review, Toronto, 312 .

SEYMOUR, REV. JAMES COOKE.
Charles Wesley.
Methodist Magazine and Review, Toronto, LIII, 523.

SHANNON, R. W., M.A.
The American Steel Strike.
The Commonwealth, Ottawa, I, 163.

SHANNON, R. W., M.A.
Canada's Relations with the United States.
The Commonwealth, Ottawa, I, 87.

SHANNON, R. W., M.A.
The late Nicholas Flood Davin.
The Commonwealth, Ottawa, I, 190, 210.

SHANNON, R. W., M.A.
The late Dr. Dawson.
The Commonwealth, Ottawa, I, 50.

SHANNON, R. W., M.A.
An Imperial Court of Appeal.
The Commonwealth, Ottawa, I, 126.

SHANNON, R. W., M.A.
Random Notes of a Reader .
The Commonwealth, Ottawa, I, 226.

SHATTON, BARBARA.
Public Meetings a Necessity.
Educational Journal of Western Canada, Winnipeg, III, 77.

SHAW, REV. AVERY A., M.A.
The Firm Foundation of God.
Acadia Athenæum, Acadia College, Wolfville, N.S., XXVIII, 198.

SHAW, A. C.
Game Laws of Ontario and Quebec.
Canadian Magazine, Toronto, XVII, 520.

SHAW, CHARLES LEWIS.
Willie Winkie.
The Commonwealth, Ottawa, I, 66.

SHAW, REV. W. I., D.D., LL.D.
Origin of the Methodist Ritual.
Methodist Magazine and Review, Toronto, LIII, 424.

Sheard, Virna.
A Maid of Many Moods. An Elizabethan Romance in Twelve Chapters.
Canadian Magazine, Toronto, XVII, 28, 178, 264, 350, 458, 542.

Sheldrake, Sparham.
Naketah.
Canadian Magazine, Toronto, XVII, 375.

Shore, Rev. T. E. E., M.A., B.D.
Methodism and City Mission Work.
Methodist Magazine and Review, Toronto, LIV, 49.

Shortt, Adam, M.A. (Professor of Political and Economic Science, Queen's University, Kingston).
The History of Canadian Currency, Banking and Exchange.
Journal of Canadian Bankers' Association, Vols. VIII and IX, 1901.

Shortt, Adam, M.A.
An Early Canadian Statesman. Hon. Richard Cartwright.
Canadian Magazine, Toronto, XVII, 448.

Shortt, Adam, M.A.
Legislation and Morality.
Queen's Quarterly, Queen's University, Kingston, VIII, 354.

Shortt, Adam, M.A.
Life in Kingston the Year after Waterloo.
Queen's Quarterly, Queen's University, Kingston, VIII, 180.

Shortt, Adam, M.A.
The Outlook for Society in 1901.
Queen's College Journal, Kingston, XXVIII, 183.

Shortt, Adam, M.A.
Reflections on University Monopoly.
Queen's Quarterly, Queen's University, Kingston, VIII, 221.

Silcox, S., B.A., B.Paed.
Sexless Schools.
Ontario Educational Association, Transactions, Toronto, 387.

Silver, Arthur P.
Shooting Wild Geese in New Brunswick.
Canadian Magazine, Toronto, XVII, 524.

Smith, Rev. E.
The Dalhousie of 1867.
Dalhousie Gazette, Dalhousie University, Halifax, XXXIII, 295.

Smith, Ernest, (Principal, King's School, Westmount, P.Q.).
The School as a Preparation for Practical Life.
Dominion Educational Association, Addresses and Transactions, Ottawa, 116.

Smith, F. Clifford.
L. O. David. (Canadian Celebrities, No. XXVII.)
Canadian Magazine, Toronto, XVII, 431.

Smith, F. Clifford.
Dr. Louis Frechette. (Canadian Celebrities, No. XXI.)
Canadian Magazine, Toronto, XVI, 443.

Smith, F. Clifford.
From out of the Night.
Canadian Magazine, Toronto, XVII, 61.

Smith, Goldwin, D.C.L.
The Age of Homer.
American Historical Review, VII, 1-10, (Oct., 1901).

Smith, Goldwin, D.C.L.
Anarchism.
New York Sun, Sept. 29th, 1901.

Smith, Goldwin, D.C.L.
The Bee *versus* Man.
New York Sun, Aug. 18th, 1901.

SMITH, GOLDWIN, D.C.L.
Between Two Fires.
New York Sun, April 25th, 1901.

SMITH, GOLDWIN, D.C.L.
British Imperialism.
The Nation, New York, September, 1901.

SMITH, GOLDWIN, D.C.L.
Constitutional Change.
Manchester Guardian, March 25th, 1901.

SMITH, GOLDWIN, D.C.L.
The Copyright Question.
University of Toronto Monthly, I, 173.

SMITH, GOLDWIN, D.C.L.
Elizabeth's Treatment of her Seamen.
Literature, London, December 7th, 1901, p. 540.

SMITH, GOLDWIN, D.C.L.
The Fourth of July.
The Independent, New York, July 4th, 1901, p. 1532.

SMITH, GOLDWIN, D.C.L.
The Genesis and Outlook of Religion.
Contemporary Review, London, LXXVIII, 898.

SMITH, GOLDWIN, D.C.L.
The Genuine Chatham.
Manchester Guardian, March 13th, 1901.

SMITH, GOLDWIN, D.C.L.
Haeckel.
New York Sun, April 7th, 1901.

SMITH, GOLDWIN, D.C.L.
The Homeric Question.
American Historical Review, VII, (Oct., 1901), pp. 1-10.
Acta Victoriana, Victoria University, Toronto, XXV. 125.

SMITH, GOLDWIN, D.C.L.
Immortality of the Soul.
New York Sun, December 1st, 1901.

SMITH, GOLDWIN, D.C.L.
The Irish Question.
North American Review, New York, June, 1901, pp. 838-853.

SMITH, GOLDWIN, D.C.L.
Keeping the Sabbath.
Toronto Star, August 26th, 1901.

SMITH, GOLDWIN, D.C.L.
The Last Phase of Napoleon.
Atlantic Monthly, Boston, February, 1901, pp. 166-172.

SMITH, GOLDWIN, D.C.L.
Liberal Policy.
Manchester Guardian, October 19th, 1901.

SMITH, GOLDWIN, D.C.L.
Martial Law.
Manchester Guardian, October 28th, 1901.

SMITH, GOLDWIN, D.C.L.
Monarchical Reaction.
Manchester Guardian, March 8th, 1901.

SMITH, GOLDWIN, D.C.L.
Municipal Reform.
New York Sun, November 17th, 1901.

SMITH, GOLDWIN, D.C.L.
Negro Criminality.
New York Sun, September 15th, 1901.

SMITH, GOLDWIN, D.C.L.
The Negro Problem.
New York Sun, September 1st, 1901.

SMITH, GOLDWIN, D.C.L.
The Object of Universities.
The Independent, New York, December 19th, 1901, pp. 3007-8.

SMITH, GOLDWIN, D.C.L.
The Old Testament and Militarism.
The Independent, New York, August 22nd, 1901, pp. 1559-60.

SMITH, GOLDWIN, D.C.L.
The Past Century.
New York Sun, April 14th, 1901.

SMITH, GOLDWIN, D.C.L.
The Political Situation in England.
North American Review, September, 1901, pp. 294-313.

SMITH, GOLDWIN, D.C.L.
Reminiscences of Gladstone.
New York Sun, June 2nd, 1901.

SMITH, GOLDWIN, D.C.L.
Shall the Press be Muzzled?
New York Sun, October 30th, 1901.

SMITH, GOLDWIN, D.C.L.
To Teachers.
The Canada Educational Monthly, Toronto, XXIV, 323.

SMITH, GOLDWIN, D.C.L.
University Confederation.
Toronto World, October 30th, 1901.

SMITH, GOLDWIN, D.C.L.
The War and its Opponents.
Manchester Guardian, July 20th, 1901.

SMITH, GOLDWIN, D.C.L.
Wellington.
Atlantic Monthly, Boston, June, 1901, pp. 771-782.

SMITH, GOLDWIN, D.C.L.
The Work of Liberalism in the Future.
The Speaker, London, December 14th, 1901.

SMITH, GOLDWIN, D.C.L.
Working Men and the War.
London Daily News, September 3rd, 1901.

SMITH, HARLAN I.
The Archæology of the Southern Interior of British Columbia.
American Antiquarian, XXIII, 25-31.

SMITH, HARLAN I. (*and* FOWKE, GERARD.)
Cairns of British Columbia and Washington.
Memoirs American Museum of Natural History, IV, 56-76.

SMITH, LIEUT.-COL. HENRY.
Military Aid of the Civil Power.
Proceedings of the Canadian Military Institute, Toronto, 1901.

SMITH, JOSEPHINE.
Perth-on-the-Tay: A Tale of the Transplanted Highlanders.
Printed for the Author, Ottawa, 1901.

SMITH, REV. J. V., D.D.
The Festival of Peace.
Acta Victoriana, Victoria University, Toronto, XXV, 130.

SMITH, L. H.
Fishing in a Great Lone Land.
Rod and Gun in Canada, Montreal, II, 523.

SMITH, T. WATSON.
John Grant—Loyalist History.
Acadiensis, St. John, N.B., I, 7.

Smith, William H.
An Incident of the War of 1812.
Paper read before the *Norfolk County Historical Society*, Simcoe, Ont., October, 1901.

Smithett, W. B.
The Preservation of the Forests.
Rod and Gun in Canada, Montreal, II, 425.

Speer, Rev. J. C.
The Greater Glory (verse).
Methodist Magazine and Review, Toronto, LIV, 324.

Speer, Rev. J. C.
The Mountain (verse).
Methodist Magazine and Review, Toronto, LIII, 530.

Squair, J., B.A.
Church Architecture in Northern France.
Ontario Educational Association, Transactions, Toronto, 212.
Acta Victoriana, Victoria University, Toronto, XXV, 120.

Squair, J., B.A.
Entrance Requirements to High Schools and Universities.
Dominion Educational Association, Addresses and Transactions, Ottawa, 178.

Squair, J., B.A. (*See* Fraser, W. H.)

Stadelman, P. C.
The Canadian Boatmen.
Overland Monthly, New Series, XXXVIII, 114.

Stafford, Dr. Joseph (Department of Zoology, McGill University, Montreal).
The Clam Fishery of Passamaquoddy Bay, New Brunswick. (With four plates.)
Contributions to Canadian Biology, 1901. (Supplement to the 32nd Annual Report of the Department of Marine and Fisheries, Ottawa), 19.

Steele, W. M.
Class Ode (verse).
Acadia Athenæum. Acadia College, Wolfville, N.S., XXVIII, 324.

Steele, W. M.
Shakespeare or Bacon? The Bi-Literal Cipher.
Acadia Athenæum, Acadia College, Wolfville, N.S., XXVIII.

Stevenson, A., B.A. (Pickering, Ont.).
The Teaching of History.
Dominion Educational Association, Addresses and Transactions, Ottawa, 226.

Stewart, E.
Forestry Conference at Kingston.
Rod and Gun in Canada, Montreal, II, 479.

Stewart, George, LL.D., D.C.L., F.R.S.C.
The Archbishop of Quebec. (Canadian Celebrities, No. XXIX.)
Canadian Magazine, Toronto, XVIII, 16.

Stewart, George, LL.D., D.C.L., F.R.S.C.
Literary Reminiscences.
Canadian Magazine, Toronto, XVII, 163.

Stewart, Miss M.
Wordsworth: A Study.
Dalhousie Gazette, Dalhousie University, XXXIII, 182.

Stickle, Charles Harris.
Poems of a Great Range.
Privately Printed, Toronto, 1901.

Stobo, Rev. Edward J. (Quebec).
The O'erturn o' Botany Bay; or, Dipper Folk Idylls. By Aletheia.
Philadelphia, *The Baptist Publishing Society*, 1901.

STOCKLEY, PROF. W. F. P., M.A.
French and English in the Nation and in the School.
The Canada Educational Monthly, Toronto, XXIV, 168.

STOCKLEY, PROF. W. F. P., M.A.
French Syntax.
The Canada Educational Monthly, Toronto, XXIV, 84.

STOCKS, MISS JEAN (Ottawa).
Play Methods of Teaching Music.
Dominion Educational Association, Addresses and Transactions, Ottawa, 395.

STODDART, R., B.A. (Listowel, Ont.).
The Study of Virgil under the present Curriculum.
Ontario Educational Association, Transactions, Toronto, 257.

STRATHCONA and MOUNT ROYAL, The Right Hon. Baron, G.C.M.G., LL.D. (*Cantab*).
Canada.
The Empire Review, London, March, 1901.

"STRAW HAT."
Desbarats Island.
Rod and Gun in Canada, Montreal, II, 476.

STRINGER, ARTHUR J.
Death and a Child (verse).
Harper's Magazine, New York, CIII, 988.

STRINGER, ARTHUR J.
Emmeline.
Canadian Magazine, Toronto, XVII, 280.

STRINGER, ARTHUR J.
Fugitive (verse).
Century, New York, LXII, 356.

STRINGER, ARTHUR J.
Hephaestus (verse).
Atlantic Monthly, Boston, LXXXVIII, 247-50.

STRINGER, ARTHUR J.
A Northern Reverie (verse).
Canadian Magazine, Toronto, XVII, 549.

STRINGER, ARTHUR J.
On a Child's Portrait (verse).
Century, New York, LXII, 860.

STRINGER, ARTHUR J.
On a Chopin Nocturne (verse).
The Bookman, New York, XIX, 156.

STRINGER, ARTHUR J.
Song in October (verse).
Canadian Magazine, Toronto, XVII, 501.

STRINGER, ARTHUR J.
War Spirit (verse).
The Bookman, New York, XIX, 416.

STRINGER, ARTHUR J.
The Woman in the Snow.
Canadian Magazine, Toronto, XVI, 513.

"STUDENT."
The Mourning Nation.
Acta Victoriana, Victoria University, Toronto, October, 1901.

SULTE, BENJAMIN, F.R.S.C.
Early French Settlers in Canada.
Report of the Ethnological Survey of Canada. (British Association for the Advancement of Science, Report, 1901), pp. 470-472.

SULTE, BENJAMIN, F.R.S.C.
Pennsylvania's First Explorer.—The Adventures of Brulé in 1616.
North American Notes and Queries, Quebec, I, 210.

SULTE, BENJAMIN, F.R.S.C.
St. Patrick's Day.—Its First Observance in Canada.
North American Notes and Queries, Quebec, I, 278.

SULTE, MME. BENJAMIN.
Customs and Habits of the Earliest Settlers in Canada.
Women's Canadian Historical Society of Ottawa, Transactions, I, 105.

SULTE, MME. BENJAMIN.
Early French Colonization.
Women's Canadian Historical Society of Ottawa, Transactions, I, 101.

SULTE, MME. BENJAMIN.
A Summary Translation of Mr. Sulte's French Article on the Destruction of the Forests of Canada.
Women's Canadian Historical Society of Ottawa, Transactions, I, 185.

SUTHERLAND, REV. ALEXANDER, D.D.
The Twentieth Century and Missions.
Methodist Magazine and Review, Toronto, LIII, 17.

SUTHERLAND, REV. DONALD.
Creation.
Printed for the Author, Gabarus, N.S., 1901.

SWEATMAN, RIGHT REV. A., D.D., D.C.L.
The History of the Congregation of Old St. Paul's.
Paper read before the *Oxford Historical Society*, Woodstock, Ont., 22nd January, 1901.

T., F. J.
Montreal, 1750-1763.
McGill Outlook, McGill University, Montreal, III, 174.

TAYLOR, REV. ERNEST M.
A Brome Octogenarian.
Transactions of the Brome County Historical Society, P.Q., I, 54.

TAYLOR, REV. ERNEST M.
Remarks on Pioneer Life in the Eastern Townships.
Transactions of the Brome County Historical Society, P.Q., I, 30.

TESKEY, ADELINE M.
Where the Sugar-Maple Grows. Idylls of a Canadian Village. Illustrated by J. S. Gordon.
New York, *R. F. Fenno & Co.*
Toronto, *The Mussen Book Co.*, 1901.

THOMAS, REV. B. H.
Investments.
Acadia Athenæum, Acadia College, Wolfville, N.S., XXVIII, 102.

THOMAS, ERNEST.
The Principles of Pauline Theology.
Queen's Quarterly, Queen's University, Kingston, Ont., VIII, 290.

THOMPSON-SETON, ERNEST.
Bird Portraits. With Descriptive Text by Ralph Hoffman.
Boston, *Ginn & Co.*
Toronto, *George N. Morang & Co.*, 1901, pp. 38.

THOMPSON-SETON, ERNEST.
Chink: The Development of a Pup.
Youths' Companion, Boston, Jan. 17th, 1901.

THOMPSON-SETON, ERNEST.
A Fifth Avenue Troubadour.
Ladies' Home Journal, XVIII, 13.

THOMPSON-SETON, ERNEST.
Krag the Kootenay Ram.
Scribner's Magazine, New York, XXIX, 693.

THOMPSON-SETON, ERNEST.
Legend of the White Reindeer.
Century Magazine, New York, LXIII, 79.

THOMPSON-SETON, ERNEST.
Lives of the Hunted. With 200 illustrations by the author.
New York, *Charles Scribners' Sons.*
Toronto, *George N. Morang & Co.*, 1901, pp. 360.

THOMPSON-SETON, ERNEST.
Mother Teal and the Overland Route.
Ladies' Home Journal, XVIII, 5.

THOMPSON-SETON, ERNEST.
Pictures of Wild Animals.
New York, *Charles Scribners' Sons.*
Toronto, *Geo. N. Morang & Co.*, 1901.

THOMPSON-SETON, ERNEST.
The Wild Animal Play.
Toronto, *Geo. N. Morang & Co.*, 1901.

THOMSON, JOHN STUART.
The Alien's Farewell (verse).
Canadian Magazine, Toronto, XVII, 523.

THOMSON, JOHN STUART.
The Months (verse).
Canadian Magazine, Toronto, XVI, 309.

THORNTON, PERCY S.
Canadian Beauty Spots—Peterboro'.
Rod and Gun in Canada, Montreal, II, 526.

TIGHE, W. B.
The West as a Field of Labour for Eastern Men.
Acadia Athenæum, Acadia College, Wolfville, N.S., XXVIII, 279.

TOD, D. S.
The Bright Side of Labour.
Educational Review of Western Canada, Winnipeg, III, 79.

TODD, H. C., M.D.
Physical Education.
Acadia Athenæum, Acadia College, Wolfville, N.S., XXVIII, 239.

TODD, THOMAS C., M.A.
The Function of Vocal Expression in Education.
Acadia Athenæum, Acadia College, Wolfville, N.S., XXVIII, 314.

TOKER, E. J.
How a Census is Taken.
Canadian Magazine, Toronto, XVI, 429.

TOM, J. E. (Inspector of Public Schools).
The Defects of the Practical Speller.
Ontario Educational Association, Transactions, Toronto, 418.

TRACY, F., B.A., Ph.D. (University of Toronto).
Psychology of Childhood. 5th Edition, Revised and Enlarged by the Addition of a new Chapter on "The Aesthetic, Moral and Religious Aspects of Mind Development."
Boston, *D. C. Heath & Co.*, 1901.

TRACY, F., B.A., Ph.D.
Review of Herman Schwartz' *Psychologie des Willens, zur Grundlegung der Ethik.*
American Journal of Theology, October, 1901.

TRACY, F., B.A., Ph.D.
Review of Wilhelm Mengel's *Kants Begrundung der Religion.*
American Journal of Theology, October, 1901.

TRACY, W. L.
A Trip down the Bay.
The University Monthly, University of New Brunswick, Fredericton, N.B., XX, 180.

TRANT, WILLIAM.
Commissioner Perry, N.W.M.P. (Canadian Celebrities, No. XXVI.)
Canadian Magazine, Toronto, XVII, 337.

TROTTER, REV. THOMAS, D.D. (President of Acadia University).
The British Baptist Pulpit of the 19th Century.
(In *A Century of Baptist Achievement.* Edited by Dr. A. H. Newman, and published by the *American Baptist Publishing Society*, Philadelphia, 1901).

TROTTER, REV. THOMAS, D.D.
The Debt of the College Graduate to Society.
Acadia Athenæum, Acadia College, Wolfville, N.S., XXVIII, 327.

TROTTER, REV. THOMAS, D.D.
The Old Evangel and the New Evangelism.
Acadia Athenæum, Acadia College, Wolfville, N.S., XXVIII, 65.

TRUELL, N. T. (Lachute, P.Q.).
The Teaching of French.
Dominion Educational Association, Addresses and Transactions, Ottawa, 328.

TRY-DAVIES, J. (*and* **WOOLSTON, MARY**).
Love and Company (Limited).
Privately Printed, Montreal, 1901.

TUCKER, ELIZABETH S. (Mrs. Tilley).
The Magic Key.
Boston, *Little Brown & Co.*, 1901.

TURNER, S.
A Record Climb up the Matterhorn.
Canadian Magazine, Toronto, XVII, 309.

TYRELL, WILLIAM.
Poems by a Business Man.
Toronto, 12mo., 1901.

V.
The King's Birthday.
The Educational Review, St. John, N.B., XIV, 218.

V.
National Flags displaying the Cross.
The Educational Review, St. John, N.B., XIV, 275.

V.
Trees and Forests.
The Educational Review, St. John, N.B., XIV, 245.

V., J.
Alfred the Great.
The Educational Review, St. John, N.B., XV, 59.

VERNON, C. W.
Historic Louisburg as it is To-day.
Acadiensis, St. John, N.B., I, 202.

VIATOR.
Ave (verse).
Canadian Magazine, Toronto, XVII, 571.

VICHERT, J. F.
John Chinaman at Home.
McMaster University Monthly, Toronto, X, 212.

VILLARD, PROF. PAUL, M.A.
The Problem of French Missionary Work in the (Methodist) Church.
Acta Victoriana, Victoria University, Toronto, XXIV, 267.

VROOM, JAMES.
Signature of Matthew Thornton.
Acadiensis, St. John, N.B., I, 131.

VROOMAN, A. E., B.A.
Relations of the Church to Social Problems.
Vox Wesleyana, Wesley College, Winnipeg, VI, 27.

W., G. R.
The Ideal Alumnus.
McMaster University Monthly, Toronto, X, 348.

WADDELL, PROF. JOHN, D.Sc., Ph.D.
On Training a Pupil to Compare.
The Canada Educational Monthly, Toronto, XXIV, 325.

WADDELL, PROF. JOHN, D.Sc., Ph.D.
Some Notes on a recent Examination Paper.
The Canada Educational Monthly, Toronto, XV, 102.

WADDELL, PROF. JOHN, D.Sc., Ph.D.
The Teacher. (Charles Macdonald.)
Dalhousie Gazette, Dalhousie University, Halifax, N.S., XXXIII, 277.

WADSWORTH, JAMES J.
On the Sojourn of Dollier de Casson and Galinée, 1669-1670 on the Banks of Black Creek, near Port Dover, Ontario.
Paper read before the *Norfolk County Historical Society*, Simcoe, Ont., 1901.

WALKER, ADRIENNE.
The French Regime from 1700 to 1760.
Women's Canadian Historical Society of Ottawa, Transactions, I, 133.

WALKER, B. E.
List of the Published Writings of Elkanah Billings.
Canadian Record of Science, VIII, 266-387.

WALLACE, PROF. FRANCIS HUSTON, M.A., D.D.
St. Francis de Sales.
Methodist Magazine and Review, Toronto, LIV, 406.

WALLACE, O. C. S., D.D., LL.D. (Chancellor, McMaster University, Toronto).
American Baptist Educational Work. Part IV. In the Dominion of Canada.
(Chapter XXIII, pp. 347-354, in *A Century of Baptist Achievement*, edited by Dr. A. H. Newman, and published by the *American Baptist Publishing Society*, Philadelphia, 1901).

WALLACE, O. C. S., D.D., LL.D.
The Value of University Social Life.
McMaster University Monthly, Toronto, X, 261.

WALSH, FRANCIS L.
The First School in Norfolk, kept by William Pitt Gilbert, in Abram Smith's shop in Charlotteville.
Paper read before the *Norfolk County Historical Society*, Simcoe, Ont., April, 1901.

WALTON, ELLA (Mrs.).
The Founding of Upper Canada.
Women's Canadian Historical Society of Ottawa, Transactions, I, 148.

WALTON, F. P.
The Queen as a Constitutional Sovereign.
McGill Outlook, McGill University, Montreal, III, 130.

WARBURTON, JUDGE A. B.
Our School System.
Prince Edward Island Magazine, Charlottetown, P.E.I., II, 363, 387.

WARD, CLARENCE.
Colonel Robert Moodie.
Acadiensis, St. John, N.B., I, 207.

WARD, WILLIAM.
The Function of Paper Money in Modern Trade.
Ontario Educational Association, Transactions, Toronto, 309.

WARE, EMILY APPLETON.
Grant us Thy Peace (verse).
Methodist Magazine and Review, Toronto, LIV, 446.

Ware, Fabian, M.A.
Some Foreign Educational Ideas.
The Canada Educational Monthly, Toronto, XXIV, 302, 330.

Warner, D. V.
A Canadian Negro V.C.
Canadian Magazine, Toronto, XVII, 113.

Watson, John, M.A., LL.D. (Professor of Moral Philosophy and Vice Principal of Queen's University).
Review of Leslie Stephen's *The Utilitarians*.
Queen's Quarterly, Queen's University, Kingston, IX, 57.

Watson, John, M.A., LL.D.
The Outlook in Philosphy.
Queen's Quarterly, Queen's University, VIII, 241.

Watson, John, M.A., LL.D.
The Sadness and Joy of Knowledge.
Queen's College Journal, Kingston, XXVIII, 231, 257.

Watson, John, M.A., LL.D.
The University and the Schools.
Queen's Quarterly, Queen's University, VIII, 323

Watson, Rev. Thomas.
Canadian Crystals. Poems.
Toronto, *William Briggs*, 1901.

Waugh, F. W.
Notes on Canadian Pottery.
Annual Archæological Report, 1901. (Being part of Appendix to the Report of the Minister of Education, Ontario), p. 108.

Webster, W. F.
Analysis of Burke's Oration on *Conciliation with the Colonies*.
The University Monthly, University of New Brunswick, Fredericton, N.B., XX, 126.

Wedd, William, M.A.
The Reverend John McCaul, LL.D.
University of Toronto Monthly, II, 2.

Welch, G. R.
The White Man's Burden.
McMaster University Monthly, Toronto, X, 160.

Wells, Kate Gannett.
David Owen of Campobello, N.B.
Acadiensis, St. John, N.B., I, 21.

Wetherald, Ethelwyn.
Boswell (verse).
Canadian Magazine, Toronto, XVIII, 73.

Wetherald, Ethelwyn.
From My Window (verse).
Canadian Magazine, Toronto, XVII, 12.

Wetherald, Ethelwyn.
Humming Bird on its Nest (verse).
Canadian Magazine, Toronto, XVII, 193.

Wetherald, Ethelwyn.
The Mind.
Acta Victoriana, Victoria University, Toronto, XXV, 111.

Wetherald, Ethelwyn.
Pains and Perils of Country School Teaching.
The Canada Educational Monthly, Toronto, XXIV, 328.

Wetherald, Ethelwyn.
The Price (verse).
Canadian Magazine, Toronto, XVI, 118.

WETHERALD, ETHELWYN.
To Time (verse).
Canadian Magazine, Toronto, XVII, 447.

WETHERALD, ETHELWYN.
Two Beggars (verse).
Canadian Magazine, Toronto, XVII, 222.

WETHERALD, ETHELWYN.
White Gifts (verse).
Munsey's Magazine, New York, XXV, 199.

WHELPLEY, J. D.
The Isolation of Canada.
Atlantic Monthly, Boston, LXXXVIII, 196.

WHELPLEY, J. D.
United States Relations with Canada.
World's Work, New York, I, 942.

WHIDDEN, REV. HOWARD P., M.A.
The Function of the Imagination in the Interpretation of Literature.
Acadia Athenæum, Acadia College, Wolfville, N.S., XXVIII, 309.

WHITE, J. F. (Inspector of Separate Schools, Toronto).
Reading in Elementary Schools.
Dominion Educational Association, Addresses and Transactions, Ottawa, 264.

WHITE, REV. WILLIAM C.
Chinese-English Dictionary of the Kien-Ning Dialect. Compiled by Wm. C. White.
Includes 11 pages of introductory matter and 47 pages of index. Contains meanings for 6,146 Chinese characters, besides 277 Romanized colloquial words for which there is no written character. It is the first dictionary of the Kien-Ning dialect.
Published by the *Methodist Episcopal Anglo-Chinese Book Concern*. Foochow, 8vo., 1901, pp. 480.

WHYTE, WILLIAM.
Asiatic Russia.
Industrial Canada, Toronto, (Convention Number), Vol. II, No. 4, p. 126.

WICKETT, S. MORLEY, B.A., Ph.D.
Translation of Bücher's *Industrial Evolution*, with a new Introduction. (In the work of translating Dr. Wickett was assisted by Dr. G. H. Needler).
New York, *Henry Holt & Co.*, 1901.

WICKETT, S. MORLEY, B.A., Ph.D.
City Government in Canada.
Canadian Magazine, Toronto, XVIII, 51.

WICKETT, S. MORLEY, B.A., Ph.D.
Commercial Education at Universities.
Canadian Magazine, Toronto, XVII, 561.

WIGHTMAN, REV. F. A.
The Commonwealth of Caribbea.
Methodist Magazine and Review, Toronto, LIII, 511.

WILKINSON, LIEUT.-COL. J. R.
Canadian Battlefields and Other Poems. 2nd Edition. Revised and Enlarged.
Toronto, *William Briggs*, 1901.

WILL, A. A.
A College Courtship.
Acta Victoriana, Victoria University, Toronto, XXV, 61.

WILLIAMS, C. H.
After Wild Geese in Manitoba.
Electric Magazine, New York, CXXXVI, (Jan. 1901).

WILLIAMS, C. H.
Fifteen Hundred Miles in Canada.
Electric Magazine, New York, CXXXVI, 487.

WILLIAMS, C. H.
The Great Lakes of North America.
Blackwood's Magazine, Edinburgh, January, 1901.

WILLISON, J. G.
The Function of Journalism in Democracy.
Queen's Quarterly, Queen's University, VIII, 298.

WILLSON, BECKLES.
The Evolution of a New World.
Strand Magazine, London, September, 1901.

WILLSON, BECKLES.
The Newfoundland Question. Is a Present Settlement with France Desirable?
Fortnightly Review, London, February, 1901, pp. 359-363.

WILLSON, BECKLES.
The Truth about Newfoundland. The Tenth Island.
London, *Grant Richards*, 1901, (2nd Ed.), pp. XII, 228.

WILLSON, MISS ALICE, B.A.
Edmond Rostand.
Ontario Educational Association, Transactions, Toronto, 194.

WILSON, ALFRED W. G.
Physical Geology of Central Ontario.
Transactions of the Canadian Institute, Toronto, Vol. VI, Part I, p. 139.

WILSON, ELIZABETH.
Vittoria in 1842.
Paper read before the *Norfolk County Historical Society*, Simcoe, Ont., February, 1901.

WILSON, H. W.
Newfoundland or France? The Peril of the French Shore.
New Liberal Review, London, April, 1901.

WILSON, REV. ROBERT, D.D.
A Peculiar People.
Methodist Magazine and Review, Toronto, LIII, 131.

WINTEMBERG, W. J.
German-Canadian Folk-Lore.
Ontario Historical Society, Papers and Records, Toronto, III, 86.

WINTEMBERG, W. J.
Drills and Drilling of Canadian Indians.
The Reliquary, VII, 262-266.

WINTEMBERG, W. J.
Supposed Aboriginal Fish Weir near Drumbo.
Annual Archæological Report, 1901. (Being part of Appendix to Report of Minister of Education, Ontario), 35.

WINTER, CAPTAIN CHARLES F.
Our Empire's Land Defence.
The Commonwealth, Ottawa, I, 23, 69.

WITHROW, REV. W. H., D.D., F.R.S.C.
The Better Side of Bismarck.
Methodist Magazine and Review, Toronto, LIV, 369.

WITHROW, REV. W. H., D.D., F.R.S.C.
A Distinguished Canadian—Sir John George Bourinot, K.C.M.G., LL.D., D.C.L.
Methodist Magazine and Review, Toronto, LIV, 45.

WITHROW, REV. W. H., D.D., F.R.S.C.
Child Wives and Child Widows.
Methodist Magazine and Review, Toronto, LIII, 276.

WITHROW, REV. W. H., D.D., F.R.S.C.
Child Wives and Child Widows of India. By D. L. Woolmer and W. H. Withrow.
Methodist Magazine and Review, Toronto, LIV, 523.

WITHROW, REV. W. H., D.D., F.R.S.C.
The Deaconess Movement in Canada.
Methodist Magazine and Review, Toronto, LIV, 83.

WITHROW, REV. W. H., D.D., F.R.S.C.
Deaconesses, Ancient and Modern.
Methodist Magazine and Review, Toronto, LIV, 183.

WITHROW, REV. W. H., D.D., F.R.S.C.
Thomas Hutchinson, the Last Royal Governor of the Province of Massachusetts' Bay. (With Portrait.)
Transactions of the Royal Society of Canada, Ottawa, Second Series, Vol. VII, Part 2, p. 63.

WITHROW, REV. W. H., D.D., F.R.S.C.
The Lady of the White House.
Methodist Magazine and Review, Toronto, LIV, 177.

WITHROW, REV. W. H., D.D., F.R.S.C.
The Life Story of Booker T. Washington.
Methodist Magazine and Review, Toronto, LIV, 483.

WITHROW, REV. W. H., D.D., F.R.S.C.
Review of Lord Rosebery's *Napoleon*.
Methodist Magazine and Review, Toronto, LIII, 281.

WITHROW, REV. W. H., D.D., F.R.S.C.
Lord Strathcona and Mount Royal.
Methodist Magazine and Review, Toronto, LIII, 80.

WITHROW, REV. W. H., D.D., F.R.S.C.
New Canadian Verse.
Methodist Magazine and Review, Toronto, LIII, 92.

WITHROW, REV. W. H., D.D., F.R.S.C.
The new Wesley Portraits.
Methodist Magazine and Review, Toronto, LIII, 562.

WITHROW, REV. W. H., D.D., F.R.S.C.
On the Corniche Road and Beyond.
Methodist Magazine and Review, Toronto, LIII, 32.

WITHROW, REV. W. H., D.D., F.R.S.C.
Religious Drift.
Methodist Magazine and Review, Toronto, LIV, 86.

WITHROW, REV. W. H., D.D., F.R.S.C.
The Romance of Missions: St. Boniface, the Apostle of Germany.
Methodist Magazine and Review, Toronto, LIV, 211.

WITHROW, REV. W. H., D.D., F.R.S.C.
Our Brother in Black.
Methodist Magazine and Review, Toronto, LIV, 483.

WITHROW, REV. W. H., D.D., F.R.S.C.
Religious Progress in the Nineteenth Century. A Review of the Moral and Religious Progress of the Century, etc. Illustrated.
(Vol. I, of *The Nineteenth Century Series*). Toronto and Brantford, and Detroit, Mich., *The Bradley-Garretson Co., Ltd.*
London, Eng., and Toronto, *The Linscott Pub. Co.*, 8vo., 1901, pp. 468, XXII.

WITHROW, REV. W. H., D.D., F.R.S.C.
Salt Lake City.
Methodist Magazine and Review, Toronto, LIII, 531.

WITHROW, REV. W. H., D.D., F.R.S.C.
Soldiering in Canada.
Methodist Magazine and Review, Toronto, LIV, 3.

WITHROW, REV. W. H., D.D., F.R.S.C.
The Storied Rhine. By H. A. Guerber and W. H. Withrow.
Methodist Magazine and Review, Toronto, LIV, 291, 430.

WITHROW, REV. W. H., D.D., F.R.S.C.
Student Life at Heidelberg. By Prof. H. Zick and Dr. W. H. Withrow.
Methodist Magazine and Review, Toronto, LIII, 487.

WITHROW, REV. W. H., D.D., F.R.S.C.
A Woman's Life for Kashmir.
Methodist Magazine and Review, Toronto, LIII, 369.

WOOD, JOANNA E.
Farden Ha'. A Novel.
London, *Hurst & Blackett.*
Toronto, *Langton & Hall*, 8vo., 1901.

WOOD, JOANNA E.
Presentation at Court.
Canadian Magazine, Toronto, XVII, 506.

WOOD, JOANNA E.
Algernon Charles Swinburne.
Canadian Magazine, Toronto, XVII, 3.

WOOD, S. G., LL.B.
A Legal Reminiscence.
University of Toronto Monthly, II, 19.

WOODS, WILLIAM CARSON.
The Isle of the Massacre.
Toronto, 8vo., 1901.

WOODSIDE, HENRY J.
Dawson as It Is.
Canadian Magazine, Toronto, XVII, 403.

WOODSIDE, HENRY J.
The Yukon River Tragedy.
Canadian Magazine, Toronto, XVIII, 108.

WOODSWORTH, CLARA M.
Mrs. Browning: An Interpretation.
Acta Victoriana, Victoria University, Toronto, XXIV, 258.

WOOLMER, D. L. (*See* WITHROW, W. H.)

WOOLSTON, MARY (*and* TRY-DAVIES, J.).
Love and Company (Limited).
Privately Printed, Montreal, 1901.

WORSLEY, P. LL.B.
The Dissipated Mind.
Dalhousie Gazette, Dalhousie University, Halifax, XXXIV, 111.

WRIGHT, H.
A Bear and a Panic.
Canadian Magazine, Toronto, XVII, 547.

WRIGHT, R. WALTER.
In the Beginning (verse).
Methodist Magazine and Review, Toronto, LIV, 311.

WRIGHT, R. WALTER.
The Stars of the East (verse).
Acta Victoriana, Victoria University, Toronto, XXV, 128.

WRIGHT, PROF. RAMSAY.
The Royal Visit.
University of Toronto Monthly, II, 14.

WRONG, PROF. GEORGE M.
Biggar's *Early Trading Companies of New France*. Edited by George M. Wrong.
University of Toronto Studies in History, 1901.

WRONG, PROF. GEORGE M.
Edited *Review of Historical Publications Relating to Canada.*
University of Toronto, 1901.

XERXES.
The Acquisitive Man.
Canadian Magazine, Toronto, XVIII, 126.

YEIGH, FRANK.
Canada at the Glasgow Exhibition.
Canadian Magazine, Toronto, XVII, 530.

YEIGH, FRANK
The Drama of Hiawatha or Mana-Bozho.
Canadian Magazine, Toronto, XVII, 207.

YEIGH, FRANK.
Sir Wilfrid Laurier. A Character Sketch.
New Liberal Review, London, Aug., 1901, pp. 136-142.

YOUNG, PROF. A. H., M.A. (Trinity University, Toronto).
The late Reverend A. J. McLeod, B.A.
University of Toronto Monthly, I, 180.

YOUNG, PROF. A. H., M.A.
The Legislation and the University Grants.
The Canada Educational Monthly, Toronto, XXIV, 184.

YOUNG, PROF. A. H., M.A.
The Text-Book Question.
The Canada Educational Monthly, Toronto, XXIV, 60.

YOUNG, PROF. A. H., M.A.
What a Pupil has a Right to Expect as a result of his High School Training in French or German.
Dominion Educational Association, Addresses and Transactions, Ottawa, 188.
The Canada Educational Monthly, Toronto, XXIV, 283.

YOUNG, EGERTON R.
Indian Life in the Great North-West.
London, *S. W. Partridge & Co.*, 1901, pp. 126.

YOUNG, REV. E. RYERSON, JUN.
Worthy of His Hire.
Methodist Magazine and Review, Toronto, LIII, 470.

YOUNG, E. T. (Hamilton, Ont.).
Optimistic, Pessimistic—Which?
Ontario Educational Association, Transactions, Toronto, 338.

YOUNG, MISS KATHERINE A.
Early Days in Maple Land.
New York, *James Pott & Co.*, 1901.

ZICK, PROFESSOR H. (*See* WITHROW).

ANONYMOUS.

Bank of Nova Scotia, History of, 1832-1900.
Privately printed, Halifax, 1901, pp. 176.

Birds, Protection of.
Educational Journal of Western Canada, Winnipeg, III, 48.

British Budget, The, and the Empire.
The Commonwealth, Ottawa, I, 82.

Burke, Edmund.
The University Monthly, University of New Brunswick, Fredericton, XXI, 34.

Canada and the Empire.
The Commonwealth, Ottawa, I, 79.

Canada, Two Official Languages in.
Saturday Review, London, XCI, 37.

Canada, United States relations with.
The Nation, New York, LXXII, 426.

Canada, Water-ways and water-power of.
Spectator, London, LXXXVII, 12.

Canadian Forestry Association, Second Annual Meeting.
Rod and Gun in Canada, Montreal, II, 503.

Dalhousie College: A Bit of History.
Dalhousie Gazette, Dalhousie University, Halifax, XXXIII, 217.

Dante and Beatrice.
McGill Outlook, McGill University, III, 139.

Dawson, George Mercer.
American Geologist, XXVIII, 67.

Dundurn, The Gates of.
Wentworth Historical Association, Journal and Transactions, Hamilton, III, 35.

Educational Misfit, An.
Educational Journal of Western Canada, Winnipeg, III, 20.

Edward VII.
The Educational Review, St. John, N.B., XIV, 196.

Empire, The—One and Indivisible.
The Commonwealth, Ottawa, I, 19.

"Empire Day" in the Primary Grades.
The Educational Review, St. John, N.B., XIV, 278.

Forestry Meeting in Toronto.
Rod and Gun in Canada, Montreal, II, 455.

French Tom Cat, The.
Prince Edward Island Magazine, Charlottetown, II, 377.

Hawthorne and Longfellow.
The University Monthly, University of New Brunswick, Fredericton, XX, 121.

History, The Reading of.
Events, Ottawa, VII, 411.

Humour and Good Stories.
Events, Ottawa, VII, 278.

Immigration.
The University Monthly, University of New Brunswick, Fredericton, XX, 178.

Independence in Parliament.
The Commonwealth, Ottawa, I, 140.

Jubilee Convention, The.
The University Monthly, University of New Brunswick, Fredericton, XXI, 12.

Libraries, The care of School.
The Educational Review, St. John, N.B., XIV, 238.

Literature, Imaginative, for the Young.
The Educational Review, St. John, N.B., XIV, 215.

Macdonald's (Sir John) Speech on Confederation.
Canadian Magazine, Toronto, XVII, 223.

Manual Training.
The Educational Review, St. John, N.B., XIV, 214.

Manual Training.
Events, Ottawa, VII, 37.

Maps, Outline.
The Educational Review, St. John, N.B., XV, 81.

Municipal Taxation.
The Commonwealth, Ottawa I, 175.

New Century, The.
Rod and Gun in Canada, Montreal, II, 424.

New Honesty, The.
The Commonwealth, Ottawa, I, 99.

Nineteenth Century, The message of.
The Commonwealth, Ottawa, I, 60.

North American Fish and Game Protective Association.
Second Annual Meeting. *Rod and Gun in Canada*, Montreal, II, 446.

Ontario, Early Records of.
Queen's Quarterly, Queen's University, Kingston, VIII, 223.

Ontario Game.
Rod and Gun in Canada, Montreal, II, 525.

Ontario Game Laws, The.
Rod and Gun in Canada, Montreal, II, 423.

Optional and Partial Courses.
Educational Journal of Western Canada, Winnipeg, III, 21.

Orbilius, The Fables of.
The University Monthly, University of New Brunswick, Fredericton, XXI, 7.

Party Government.
The Commonwealth, Ottawa, I, 119.

Queen Victoria.
The University Monthly, University of New Brunswick, Fredericton, XX, 128.

Queen's Council and Senate to His Majesty Edward VII.
Queen's College Journal, Kingston, XXVIII, 158.

Reading, On.
The University Monthly, University of New Brunswick, Fredericton, XX, 144.

Report, Archaeological (Being part of appendix to the Report of the Minister of Education, Ontario, 1901).
Toronto, *Warwick Bros. & Rutter*, 1901, pp. 62.

Report, Bureau of Mines, Ontario, 1901.
Toronto, *L. K. Cameron*, 1901, pp. 236.

Report, Canadian Forestry Association.
Ottawa, *Government Printing Bureau*, 1901, pp. 64.

Report of the Geographic Board of Canada.
Ottawa, *S. E. Dawson*, 1901, pp. 45.

Report, Geological Survey of Canada.
Ottawa, *S. E. Dawson*, 1901, pp. 867.

Report, Summary, Geological Survey of Canada.
Ottawa, *S. E. Dawson*, 1901, pp. 203.

Report, Annual, of Minister of Mines (B.C.).
Victoria, *Richard Wolfenden*, 1901, pp. 1026.

Report, Department of Mines (N.S.).
Halifax, N.S., 1901.

Review of Bourinot's "Canada under British Rule."
The Commonwealth, Ottawa, I, 116.

Review of Bourinot's "Manual of the Constitutional History of Canada."
The Commonwealth, Ottawa, I, 213.

Review of Crozier's "Civilization and Progress."
The Commonwealth, Ottawa, I, 113.

Review of Crozier's "History of Intellectual Development."
The Commonwealth, Ottawa, I, 113, 133.

Review of Rémy de Gourmont's "Esthétique de la Langue Française."
The Commonwealth, Ottawa, I, 114.

Review of Rémy de Gourmont's "La Culture des Idées."
The Commonwealth, Ottawa, I, 153.

Review of Prof. Saintsbury's "History of Criticism."
The Commonwealth, Ottawa, I, 155.

Scadding, The late Reverend Henry, D.D.
Transactions of the Canadian Institute, Toronto, VI, 235.

Speech, The famous, of Rev. Major Smith, C.B.
Canadian Magazine, Toronto, XVI, 262.

Spelling Reform.
The Commonwealth, Ottawa, I, 80.

Split Infinitive, The.
The Commonwealth, Ottawa, I, 73.

Student Life, Incidents of.
The University Monthly, University of New Brunswick, Fredericton, XXI, 9.

Temagami, Lake, Reserve.
Rod and Gun in Canada, Montreal, II, 454.

Tree Planting in the West.
Rod and Gun in Canada, Montreal, II, 455.

University Question, The. One University for Ontario, or two, three, or more, as may be needed.
The Queen's College Journal, Kingston, XXIX, 18.

Upper Canada College, Roll of Pupils, from 1829 to 1900, with Appendices. Published by the Upper Canada College Old Boys' Association.
Toronto, *Warwick Bros. & Rutter*, 1901, pp. 87.

INDEX OF TITLES.

Abandoned Farmer . . . . Preston, S. H.
Aboriginal fish wier near Drumbo . . . Wintemburg, W. J.
Acadia Man, An. . . . . Barrs, J. E.
Acadia, Aesthetic attributes of. . . . . Jack, I. A.
Acadian Element in Nova Scotia . . . . MacLean, Annie M.
Acadian Monarch . . . . McCarthy, Patrick.
Acadians, The . . . . Dawson, Mrs. S. E.
Acadians . . . . *See* LaVallière; Traditions.
Acquisitive Man. . . . . Xerxes.
Across the Barrier of Years . . . . . Pettit, Maude.
Addresses at McGill University. . . . MacCallum, D. C.
Adventure of Mrs. McKenzie . . . . . Scott, D. C.
Alaska Boundary Question . . . . . . Begg, Alex.
Albert County, Points of Interest . . . Burns, H.
Alfred the Great . . . . Graham, H. W.
Alfred the Great . . . . V., J.
Alfred the Great . . . . *See* Millenary, Winchester.
Algonkian Folk-lore . . . . Chamberlain, A. F.
Alias "Jackson" . . . . Clarke, C. Langton.
Allen, The late J. A. . . . . Machar, Agnes M.
Alma-Tadema, Laurence . . . . McEvoy, Bernard.
Alumnus, The Ideal . . . . W., G. R.
Amateur Burglary, Our . . . . Oxley, J. M.
American Cousins, Our, and Patriotism. . . . . Cameron, Agnes D.
American Problem, An . . . . Graham, H. W.
American University as a National Factor. . . . . Osborne, W. F.
American Steel Strike . . . . Shannon, R. W.
American's Sentiments towards the British. . . . . Ross, H. D.
Amos the Man and the Book . . . . . Jordan, W. G.
Anarchism . . . . Smith, Goldwin.
Ancient Science. . . . . *See* Pyramids.
Annexation *vs.* Imperialism. . . . . . Charlton, John.
Animal Intelligence . . . . Mills, Prof.

Annals of our First Missions	Lamothe, Mme. H. G.
Annual Register (Morangs)	Hopkins, J. C.
Anthology of English Poetry	Alexander, W. J.
Anti-Rationalism in the early Christian Church	Brown, J. W.
Arbor Day	M., A. H.
Archæological Report, Ontario	
Archæology of Southern British Columbia	Smith, H. I.
Archæology	*See* Cairns; Canadian Pottery; Earthwork; Folk-Lore; Gambling; Huron; Indians; Iroquois; Mounds; North Victoria; Ossuary; Skulls; Wooden Relics; Yellow Point.
Architecture, Church, in Northern France	Squair, J.
Archives	*See* Canadian.
Arnobius	*See* Anti-Rationalism.
Arnold, Matthew, Poetry of	Macpherson, W. E.
Arnold, Thomas, on Personal Education	Morse, R. O.
Art Education	Semple, Jessie P.
"As Others See Us"	Hanbury-Williams, Charles.
Assyria	*See* Babylonia.
Astronomy, the Great Macrocosm	Hoover, Martin.
Astronomy, Siderial	Clawson, J. W.
Atlin Glacier, A Visit to	Boyd, W. H.
Atnas, Who are the	Morice, A. G.
Baby Bunting	Low, May A.
Babylonia and Assyria	Murison, G.
Backslider, The	Allen, Grant.
Bank of Nova Scotia, History of	*Anon.*
Baptist Educational Work	Wallace, O. C. S.
Baptist Pulpit, The British	Trotter, Thos.
Baptists of Canada	Farmer, J. H.
Baptists of Maritime Provinces	Keirstead, E. M.
Bar Dinner, The	Boyd, Sir J. A.
Barker, David	Barker, J. S.
Bass of Ontario	Nash, C. W.
Bear, A, and a panic	Wright, H.
Bee *vs.* Man	Smith, Goldwin.
Bergen, Worth	Lloyd, Wallace.
Between two Fires	Smith, Goldwin.
Bible should be text-book in Schools	Cook, W. A.
Bible, should it be text-book in schools	Fraser, C. G.
Bible in public schools	Scott, Wm.
Bible in the schools	Robertson, W. J.
Biblical criticism and its results	Harrison, W.
Billings, Elkanah, Sketch of	Ami, H. M.
Billings, Elkanah, List of writings	Walker, B. E.
Biological, Marine, station of Canada	Prince, E. E.
Bird Portraits	Seton-Thompson, E.
Birds, Protection of	*Anon.*
Bishop, Making of a	Pense, E. J. B.
Bismarck, Better side of	Withrow, W. H.
Blackfoot Amusements	Maclean, John.
Blackmore	Sawtell, R. W.
Blackmore and *Lorna Doone*	Burpee, L. J.
Blood Pressure	Rudolf, R. D.
Bluff by the Sea	Petitt, Maude.
Bond, The, Phi Sigma	Aylesworth, A. B.
Book-plates	Jack, D. R.

Books, Talks About . . . . Campbell, John.
Books and Men . . . . Osler, Prof.
Bourinot . . . . *See* Canadian, Distinguished.
Bourinot's "Canada under British Rule." . . . . *See* Review.
Bourinot's "Constitutional History of Canada." . . . . *See* Review.
Boy of the Banks . . . . Oxley, J. M.
"Bragh," The Old, or Hand Mill. . . . McKellar, A.
Brains, Has man three. . . . . Partridge, Dr.
Brant, Joseph . . . . *See* Thayendanegea.
Breckenridge, Mary Warren . . . . . *See* Recollections.
Brigands and Brigandage. . . . . . . Blunt, J. E.
Bright Side of Labour. . . . . Tod, D. S.
Britain's one Utopia. . . . . Hunt, F. L.
Britain's rivals and Britain's trade. . Campbell, A. C.
Britain's title in South Africa. . . . . Cappon, James.
British Budget and the Empire. . . . *Anon.*
British Diplomacy . . . . MacVane, S. M.
British Empire, Growth of. . . . . . . Ross, G. W.
British Empire, Unity of . . . . Mills, David.
British Imperialism . . . . Smith, Goldwin.
British Pulpit, The modern. . . . . . Maggs, J. T. L.
British . . . . *See* American.
British . . . . *See* Baptist.
British Columbia, Archaeology of . . . Smith, H. I.
British Columbia, Cairns of. . . . . . Smith, H. I.
British Columbia, First clearing in. . Bindloss, Harold.
British Columbia, History of. . . . . Gosnell, R. E.
British Columbia . . . . *See* Sk. gomic; Totemism.
Brome Octogenarian. . . . . Taylor, E. M.
Brother in Black, Our. . . . . Withrow, W. H.
Browning's Message to Humanity. . . Graham, M. M.
Browning, Mrs., An Interpretation. . . Woodsworth, Clara M.
Browning, Mrs., Love Life of. . . . . Powell, M. E.
Browsings from an Old Pasture . . . Sawtell, R. W.
Brulé. . . . . *See* Pennsylvania's First Explorer.
Brymner, Douglas . . . . Scott, M. O.
Bücher's "Industrial Revolution," (Translation) . . . . Wickett, S. M.
Bugler, Boy, The. . . . . Dowsley, E.
Burke, Edmund . . . . *Anon.*
Burke's "Conciliation with the Colonies.". . . . . Webster, W. F.
Bytown, The founder of. . . . . Friel, Mrs. H. J.
Bytown, Some account of. . . . . . . Kenny, E. G.
Bytown. . . . . *See* Ottawa; Rideau Canal.

Cable Service, An Imperial . . . . . . Fleming, Sir S.
Caine's *Eternal City*. . . . . *See* Review.
Cairns of British Columbia . . . . . . Smith, H. I., and Fowke, G.
Cairo and its Panorama. . . . . Braid, M. H.
Call from the Gorge. . . . . Dafoe, J. W.
Camera Club . . . . Johnstone, H. M.
Camp Rustenburg, Communication from. . . . . Ross, A. E.
Canada . . . . Strathcona, Lord.
Canada and the Empire. . . . . *Anon.*
Canada at Glasgow Exhibition . . . . Yeigh, Frank.
Canada, British rule in . . . . Bourinot, Sir J. G.
Canada, City Government in . . . . . Wickett, S. M.
Canada, Coal Fields of. . . . . Cassidy, James.
Canada, Constitutional History of . . . Bourinot, Sir J. G.
Canada, Earliest Beginnings of. . . . Harper, J. M.
Canada, Earliest Settlers of. . . . . . Sulte, Mme. B.

Canada, Fifteen hundred miles in. . . .	Williams, C. H.
Canada in Nineteenth Century	Bourinot, Sir J. G.
Canada, Isolation of.	Whelpley, J. D.
Canada, Maids and Matrons of.	Pepper, M.S.
Canada My Home	Balfour, Grant.
Canada, New	McIntyre, C. H.
Canada, Progress of	Hopkins, J. C.
Canada, Royal Visits to.	Bourinot, Sir J. G.
Canada under British Rule	Bourinot, Sir J. G.
Canada under Victoria.	Cooper, J. A.
Canada, United States Relations with .	Whelpley, J. D.
Canadian Archives, Report on.	Brymner, D.
Canadian Archives, Supplement.	Richard, E.
Canadian Art.	McHenry, K. V.
Canadian Art, A Decade of	Fairbairn, M. L.
Canadian Banking	Shortt, Adam.
Canadian Beauty Spots—Peterboro' . .	Thornton, P. S.
Canadian Boatmen.	Stadelman, P. C.
Canadian Celebrities:—	
The Late J. A. Allen.	Machar, Agnes M.
Archbishop of Quebec	Stewart, George.
Douglas Brymner.	Scott, M. O.
L. O. David.	Smith, F. C.
Hon Donald Farquharson.	Mellish, A. E.
Dr. Louis Fréchette	Smith, F. C.
Dr. A. H. Mackay.	De Mille, A. B.
Jean McIlwraith	MacMurthy, M.
Commissioner Perry	Trant, Wm.
F. H. Torrington.	Godfrey, H. H.
Canadian Census.	Davidson, John.
Canadian Coins and Tokens.	McCall, W. C.
Canadian Contingents and Canadian Imperialism.	Evans, W. S.
Canadian Contingents, Golden Book of.	Labat, G. P.
Canadian Copyright	Mavor, Prof. James.
Canadian, Distinguished — Sir John Bourinot	Withrow, W. H.
Canadian Essays.	O'Hagan, Thos.
Canadian Golden Wedding Medals . . .	McLachlan, R. W.
Canadian History, A Forgotten Page of.	Carnochan, Janet.
Canadian History Readings.	Hay, G. U.
Canadian History, Study of.	FitzGibbon, Agnes.
Canadian Imperialism in England . . .	Patterson, Norman.
Canadian in China.	Manley, H. B.
Canadian Industries	Johnson, Geo.
Canadian Industry, A New	Bone, J. R.
Canadian Life, Twenty-Five Years of .	Portlock, Mrs. Rosa.
Canadian Magazines, A Century of. . .	Colquhoun, A. H. U.
Canadian Magazines, Early.	Hornung, L. E.
Canadian Manufactures	*See* South Africa.
Canadian Methodist History, Early. . .	Dewart, E. H.
Canadian Mint, The	Cooper, J. A.
Canadian Negro V.C..	Warner, D. V.
Canadian Novels and Novelists.	Burpee, L. J.
Canadian Patriotic Calendar	MacFarlane, John.
Canadian Parliamentary Guide	Magurn, A. J.
Canadian People, Origin of	Campbell, Mrs. W. W.
Canadian Poet, A	Burpee, L. J.
Canadian Poetry, A Decade of	Scott, D. C.
Canadian Poets, Notes on.	James, C. C.
Canadian Polar Expedition	Bernier, J. E.
Canadian Pottery, Notes on.	Waugh, F. W.
Canadian Prose, A Decade of.	Hornung, L. E.
Canadian Prose Writers.	Burpee, L. J.

Canadian Regiment, Royal	Ahearn, Mrs. Thos.
Canadian Statesmen, Early	Shortt, Adam.
Canadian Verse, New	Withrow, W. H.
Canadian Verse Writers	Burpee, L. J.
Canadian Voyageurs	Bryan, Claude.
Canadians, The French	Kennedy, H. A.
Canada's Attitude towards Labour	Harper, H. A.
Canada's Commercial Metropolis (Montreal)	Byrne, Samuel.
Canada's Exports of manufactures	Johnson, Geo.
Canada's Northern Boundary	B., R. H. C.
Canada's Place in English Literature	De Mille, A. B.
Canada's Relations with the United States	Shannon, R. W.
Canada	*See* Annual Register; Baptist; Biological; Canals; Contingents; Deaconess; Early Days; French-Canadians; Geographic Board; Geological Survey; Golf; Indians; Industries; Labour; Land Tenure; Legislation; North-West; Official Languages; Political Institutions; Prose; Railway Policy; Roosevelt; Schools; South Africa; Statistical Year Book; Upper Canada; United States; War of 1812; Waterways; Western Canada; Yachting.
Canals of Canada	Fawcett, W.
Canary Islands	*See* Spanish.
Canoe, How to build a	Braithwaite, H. and Risteen, F. H.
Cape Breton	Brown, Robt.
Cape Breton, Past and Present	Grant, W. L.
Cape Breton	*See* Steel Making.
Cappon's "Britain's Title in South Africa."	*See* Review.
Carlyle's "Hero-Worship."	MacMechan, A. (*Ed.*)
Carlyle's "Hero-Worship."	*See* Review.
Census, How it is taken	Toker, E. J.
Census	*See* Canadian Census.
Century, New	*Anon.*
Century of Achievement	Coyne, J. H.
Century, Past	Smith, Goldwin.
Century	*See* Nineteenth.
Chamberlain's Chaff	MacFarlane, T.
Character	Mersereau, I. F.
Character Modified by Education	Cameron, Agnes D.
Charlie—Circus Usher	Douglas, Graham,
Charlotte, Elizabeth	Owen, Elizabeth A.
Charlottetown—Fifty years ago	M., E. L.
Chase of the Tide	Duncan, Norman.
Chatham, The Genuine	Smith, Goldwin.
Chaucer, Life and Times of	Page, R. B.
Chaucer, The Pathos in	Raymond, W. O.
Cheese, Ripening of	Harrison, F. C.
Chesnel's *La Salle*	*See* Review.
Child Study, What it has done for Education	Scott, Wm.
Child	*See* India.
Children	"Lounger."
Chicamon Stone	Phillips-Wolley, Clive.
China of a Year Ago and To-day	Drew, E. B.
China	*See* Canadian in China; Mongolian; Printing-Press; Women.
Chinaman, John, at Home	Vichert, J. F.

Chinese-English Dictionary	White, W. C.
Chink: The Development of a Pup	Thompson-Seton, E.
Christ, The Fact of	Hutchins, W. N.
Christ, The Mind of	Ingram, J. F.
Christ's Teaching, Infallibility of	Ross, James.
Christian Instruction in Schools of Ontario	Middlemiss, J.
Christian, Making of	MacLean, John.
Christian Science	Cameron, P.
Christian Theology, Manual of	Burwash, N.
Christianity and its Evidences	Mowat, Sir O.
Christianity, Ethical Development of	Scrimger, J.
Christmas Talks and Stories	Patterson, Mrs. S. B.
Chrysler's Farm, Battle of	Rheaume, Mme.
Church, Relations to Social Reform	Vrooman, A. E.
Church	*See* Architecture.
Churches, Messengers of	Sanderson, J. E.
Churchill, Winston	Bryan, Claude.
Civics, A plea for the teaching of	Findlay, W. N.
Clam Fishery of Passamaquoddy Bay	Stafford, Joseph.
Classics in Ministerial Education	Milligan, G. M.
Classics, The Study of	Hagarty, E. W.
Classics	*See* Greek; Tragedy; Homer; Horace; Philosophy; Sophocles; Socrates; Virgil.
Clayton-Bulwer and Hay-Pauncefote Treaties	Cumming, L. H.
Coats of Arms and their Meanings	Hemsley, R.
Codman's *Expedition to Quebec*	*See* Review.
Coinage	*See* Imperial.
Coins and Tokens	*See* Canadian.
Colin Clout's Calendar	Allen, Grant.
College and the Student	Dingwall, E. Edna.
College, The City and	Murray, W. C.
College Courtship, A	Will, A. A.
College Days	Harcourt, Hon. R.
College Graduate, Debt of, to Society	Trotter, T.
College, Ladies, in our Educational System	Armstrong, W. D.
College Man as a Citizen	Keirstead, J. W.
College Paper, How to run a	Farris, J. W. D.
Colleges and Citizenship	Harper, H. A.
Colonial Silver, Old	Jack, D. R.
Colony, A forgotten corner in	Cameron, Agnes D.
Color Lessons	Patterson, Mrs. S. B.
Commercial Education	Eddis, W. C.
Commercial Education	Loudon, President.
Comic Element in Henry V	Raymond, W. O.
Commonwealth of Caribbea	Wightman, F. A.
Composition	Brough, T. A.
Confession, Revision of	Scrimger, John.
Constitutional Change	Smith, Goldwin.
Contingents, Passing of	Patterson, Norman.
Contingents	*See* Canadian Contingents.
Conversion of Mametoose	Browning, A.
Convocation, Address to	Grant, G. M.
Copyright Question	Smith, Goldwin.
Copyright	*See* Canadian Copyright.
Coqualicet	Scott, D. C.
Corea, A Visit to, in 1899	Lewis, Helen, F. M.
Corelli, Marie	Longley, Hon. J. W.
Corniche Road, On the	Withrow, W. H.
Country School Teaching	Wetherald, Ethelwyn.
Crawford, Isabella Valancy	Burpee, L. J.

Cravate Rouge, La—A French Canadian Sketch	Cox, W. S.
Crees	*See* Gambling.
Cricket Season of 1901	Hall, J. E.
Criticism	*See* Higher.
Creation	Sutherland, D.
Croft, Henry Holmes	Ellis, W. H.
Cromwell, Life of	*See* Review.
Crow's Nest, The	Cotes, Mrs. Everard.
Cross Island Light	De Mille, A. B.
Crozier's *Civilization and Progress*	*See* Review.
Crozier's *Intellectual Development*	*See* Review.
Crushed Flower, A	Petitt, Maude.
Culture, Essentials of	Le Sueur, W. D.
Cumberland's *Union Jack*	*See* Review.
Curious Addresses	Churchill, Helen T.
Curtailed Visit, A	De Mille, A. B.

Dalhousie College: A bit of History	*Anon.*
Dalhousie of 1867	Smith, E.
Dalhousie's new professors	Murray, W. C.
Dalhousie	*See* Municipal.
Dante and Beatrice	*Anon.*
Dante's Conception of Evil	Saunders, Lois.
David, L. O.	Smith, F. C.
Davin, The late Nicholas Flood	Shannon, R. W.
Dawson, Dr. G. M.	Ami, H. M.
Dawson, George Mercer	*Anon.*
Dawson, The late Dr.	Shannon, R. W.
Dawson, Sir William, Autobiographical Notes	Dawson, Rankine.
Dawson as it is	Woodside, Henry J.
Day Afield, A	C., F. H.
Deaconess Movement in Canada	Withrow, W. H.
Deaconesses, Ancient and Modern	Withrow, W. H.
Decimals and Decimalisation	Harvey, Arthur.
Deer Hunt, 1900	S., J.
Deer Hunt, Swan Valley	Finch, A. H.
Democracy	*See* Journalism.
Déné Surgery	Morice, A. G.
Dénés, Classification of	Morice, A. G.
Denison's "Soldiering in Canada."	*See* Review.
Desbarats' Island	"Straw Hat."
Deutschamerikanischer Lehretag	Hogarth, E. S.
Devil in Law, The	Rogers, R. V.
Dictionary	*See* Chinese.
Dissipated Mind, The	Worsley, P. J.
Divine Pursuit, The	McFadyen, J. E.
Doctrine of the Holy Spirit	Scrimger, John.
Dollier de Casson and Galinée on Black Creek	Wadsworth, J. J.
Dominica, Log of a Missionary Deputation	Hunter, T. W.
Dominion, Story of the	Hopkins, J. C.
Dominion registration of Teachers	Robins, S. P.
Dooley, Mr.	*Anon.*
Doubts and Doubters	Jenner, J. H.
Doukhobors of Canada	Baker, Nellie N.
Drawing course of the public school	Dobbie, J. A.
Drummond Island *Voyageurs*, List of	*Anon.*
Drummond Island	*See* Voyageurs.
Duck Shooting on Lake Temiscamingue	Farr, C. C.
Duff's "Old Testament Theology."	*See* Review.
Duke, The: A passing glimpse	Clark, J. T.

Duke, The, and Duchess of York at home	Bryan, Claude.
Dundurn, Gates of	*Anon.*
Dying Speeches and Confessions of XIX Century	Griffin, M. J.
Early Days in Maple Land	Young, Catherine A.
Early Settlements (in Ontario)	*See* Grenville; March; Prince Edward County.
Earthwork in Township of Moore	Boyle, David.
Easter, Significance of	Clark, Prof. Wm.
Eastern Townships, Life in	McAleer, Geo.
Eastern Townships	*See* Pioneer Life.
Ecclesiastes, The Book of	Milligan, G. M.
Echoes of the Past	Jones, R. V.
Economic Association, National	Hughes, J. L.
Economics of Trades Unions	Patterson, J. W.
Economics in the High School	LeRossignol, J. E.
Educated Gentleman, An	Bill, I. E.
Education, Conservative and Liberal in	Dupuis, N. F.
Education for the Twentieth Century	Millar, John.
Education in Europe	Addison, M. E. T.
Education in Nova Scotia	Creighton, G.
Education in Ontario	Hughes, Mrs. A. M.
Education in Ontario, Transitional years	Hodgins, J. Geo.
Education in Upper Canada, History of	Hodgins, J. Geo.
Education of Women in Nova Scotia	Sawyer, A. W.
Education, Physical	Creed, H. C.
Education, Physical	Todd, H. C.
Education, Relation of to Morality	Morden, W. S.
Education, Secondary, in England	Pakenham, W.
Education, Technical	Klotz, Otto J.
Education, Technical, in Ontario	Loudon, President.
Education, Third Element of	Harper, J. M.
Education, True End of	Rand, Edith H.
Education, Vocal expression in	Todd, Thos. C.
Education	*See* Arnold, Art; Baptist; Character; Child Study; College; Commercial; Entrance Requirements; History; Independent; Inspector; Kindergarten; Languages; Libraries; Manual Training; Method; Nature Study; New Brunswick; Ontario; Optional Courses; Philology; Physical Training; Practical Speller; Primary; Prince Edward Island; Psychology; School; Student; Teacher; Text-Book; Training; University; Women.
Educational Bureau for Canada	Harper, J. M.
Educational Bureau for Canada	Boucher de la Bruère, P.
Educational demand of Democracy	Millar, John.
Educational Ideas, Some Foreign	Ware, Fabian.
Educational Misfit, An	*Anon.*
Educational Problems in Toronto	Hamilton, J. C.
Educational Matters, Looking ahead in	Riddell, J. H.
Educational requirements of to-day	Johnston, Wm.
Edward VII	*Anon.*
Edward VII, Career of	Hopkins, J. C.
Edward VII, Visit to Woodstock	Sawtell, R. W.
Edward VII	*See* King.
Elementary Schools, Reading in	White, J. F.
Eliot, George, Characterization of	Scott, H. G.
Elizabeth Books, The	Burpee, L. J.

Elizabeth's Treatment of her Seamen	Smith, Goldwin.
Eloisa, A Modern	Morse, Chas.
Emmeline.	Stringer, A. J.
"Empire Day" in the Primary Grades	*Anon.*
Empire, Founder of	Browning, A.
Empire—One and Indivisible	*Anon.*
Empire's Land Defences	Winter, C. F.
Empire	*See* Canada; Imperial.
End of the Story	Cameron, Agnes D.
Engineer as a factor in Civilization	Eastman, H. M.
Engineers, Where they are educated	Bain, J. W.
England, Country and Town in	Allen, Grant.
English at Trinity University	MacMurchy, A.
English Composition in the High School	Carnochan, Janet.
English History, Stories from	*Anon.*
English, King's	Cameron, A.
English Literature in the Lower Grades	Robinson, E.
English Literature	*See* Canada.
Entrance requirements	Squair, John.
Epic of a Prairie Farm	Bindloss, H.
Epitaphs	Holling, T. E.
Ethnographical Elements of Ontario	Hunter, A. F.
Ethnological observations in South Africa	Laidlaw, G. E.
Evangeline, Longfellow's	De Mille, A. B. (*Ed.*)
Evolution of a New World	Willson, Beckles.
Examinations, Provincial, in Nova Scotia	McKay, A.
Explorations in Great Bear Region	Bell, J. M.
Faithful unto Death	Hornung, L. E.
Faraday, Michael	Scott, A. M.
Farden Ha'.	Wood, Joanna E.
Farnham's *Life of Parkman*	*See* Review.
Farquharson, Hon. Donald	Mellish, Annie E.
Father of St. Kilda, The	Campbell, R.
Fiedmond, Jacau de	Gaudet, Placide P.
Fifth Avenue Troubadour	Thompson-Seton, E.
Fifty Years in Canada (Sir W. Dawson)	Dawson, R.
Fighting Vocabulary, Our	Crofton, F. B.
Firm Foundation of God	Shaw, A. A.
Fish-Life, Effect of Polluted Waters on	Knight, A. P.
Fish, Predacious, Planting of	Prince, E. E.
Fish	*See* Aboriginal; Bass; North American; Trout.
Fishery Legislation	Prince, E. E.
Fishing in a Great Lone Land	Smith, L. H.
Fitzgerald's Rubaiyat of Omar Khayyam	*See* Review.
Flags, National, displaying the Cross	V.
Flora of St. Andrews	Fowler, James.
Foiled by a Violin	Hill, H. J. T.
Follow directions. (Photography)	Johnstone, H. M.
Folk-Lore, Algonkian	Chamberlain, A. F.
Folk-Lore, German-Canadian	Wintemberg, W. J.
Folk-Lore of Shakespeare's Garden	M., H.
Folk-Lore, Philosophy of	Boyle, D.
Folk-Lore	*See* Blackfoot amusements.
Folk-Thought, Transference of	Chamberlain, A. F.
Forest conditions, European and Canadian	Ross, N. M.
Forests of Canada, Destruction of	Sulte, Mme. B.
Forests, Preservation of	Smithett, W. B.
Forests, What about our	Ruthven, Ed.

Forestry Association, Canadian, Second Meeting	*Anon.*
Forestry Conference at Kingston	Stewart, A.
Forestry Meeting at Toronto	*Anon.*
Forestry, Problem in	Mitchell, A.
Forestry	*See* Re-Afforesting; Trees.
Fourteen Days	d'Easum, B. C.
Francis (Saint) de Sales	Wallace, F. H.
Franklin	*See* North.
Fraser, Miss Wynifred	Hill, H. J. T.
Fréchette, Dr. Louis	Smith, F. C.
Freiligrath, Ferdinand	Lochart, A. J.
French and English in Nation and School	Stockley, W. F. P.
French and German Children learning English	Lerew, G. A.
French Canada, Christmas Games in	Oxley, J. M.
French Canada, Stories of	Burpee, L. J.
French-Canadian Life and Literature	O'Hagan, T.
French-Canadian, The Present-Day	LeMay, Geo.
French-Canadians, The	Kennedy, H. A.
French-Canadians	*See* Canadians; French; Cravate Rouge.
French Colonization, Early	Sulte, Mme. B.
French Composition, Elements of	Cameron, J. H.
French Régime, 1700 to 1760	Walker, A.
French Settlers in Canada, Early	Sulte, B.
French Syntax	Stockley, W. F. P.
French, Teaching of	Truell, N. T.
French Tom Cat	*Anon.*
Freneuse, Lease of Seignieury of	Ganong, W. F.
From Out of the Night	Smith, F. C.
Frontenac, Second Administration of	LaRue, Lea.
Galinée	*See* Dollier de Casson.
Gambling Among the Crees	Laidlaw, G. E.
Game Laws of Ontario and Quebec	Shaw, A. C.
Game	*See* Grouse; Moose; North American. Ontario; Pheasants; Wild Geese.
Garibaldi	Haydon, A. E.
Gaspe Sketches	MacMurchy, M.
Geese, Wild, in Manitoba	Williams, C. H.
Genius, A Note on	Oxley, J. M.
Geographic Board of Canada, Annual Report	*Anon.*
Geological Survey of Canada, Annual Report	*Anon.*
Geological Survey of Canada, Summary Report	*Anon.*
Geology of Minas Basin and Vicinity	Ells, R. W.
Geology, Physical, of Central Ontario	Wilson, A. W. G.
George's *Life of Henry George*	*See* Review.
German Reichstag, The	Munro, W. B.
German	*See* French; Goethe; Leibnitz; Schools: Schopenhauer; Schwarz; Sudermann.
German-Canadian	*See* Folk-Lore.
Gibbon's *Roman Empire*	*See* Review.
Gladstone, Reminiscences of	Smith, Goldwin.
Glen Gordon, A Trip to	S., J.
Glorious Enterprise, The	Lighthall, W. D.
Goethe's *Faust*	Hornung, L. E.
Golf	Haultain, Arnold.
Golf in Canada	Kerr, W. A. R.
Gourmont's *Culture des Idées*	*See* Review.
Gourmont's *Esthétique de la Langue Française*	*See* Review.

Graham's *English PoliticalPhilosophy*	*See* Review.
Grammar, Elementary English	Goggin, D. J.
Grammar, Teaching	Bonis, H.
Grant, John—Loyalist History	Smith, T. W.
Gratitude of Ugly Mug	Oxley, J. M.
Great Britain	*See* England; Trade War.
Great Lakes	*See* Shipping.
Greece, The Mission of	Robertson, J. C.
Greek and Latin in Secondary Schools	Henderson, John.
Greek Church Doctrine, Manuals of	Duckworth, H. T. F.
Greek Letters, A Dream of	Hutton, Maurice.
Greek, Study of	Dupuis, N. F.
Greek Tragedy	Haydon, A. E.
Green's *William Pitt*	*See* Review.
Grenville County, Settlement of	Burritt, Mrs. A.
Grey Day and a Golden	Blewett, Jean.
Grouse, Habits of	Brown, R. H.
Grown Baby	Blewett, Jean.
Guyon, Madame	Delmage, Edith R.

Habitants, A summer among	Kerr, W. A. R.
Hades, My descent into	Alward, Silas.
Haeckel	Smith, Goldwin.
Ha-Hin, Chinaman	Pattullo, G. R., Jr.
Half a Century's Progress	Reade, John.
Haliburton, Robt. Grant	Denison, G. T.
Halsey's *Old New York Frontier*	*See* Review.
Hamilton, Early Life in	Kidner, F.
Hamilton's Crystal Palace	Kidner, F.
Hannay's *War of 1812*	*See* Review.
Harper, The late Henry A.	King, W. L. M.
"Have" Rimes	Cameron, A.
Hawaii, In	Ross, Mary S.
Hawaiian Pantheon, The	Peck, H. W.
Hawthorne and Longfellow	*Anon.*
Heart of a Red-Man	Kingsmill, E. T.
Heavysege, Charles	Burpee, L. J.
Heidelberg, Student Life at	Zick, H., and Withrow, W. H.
Hellmuth, The late Rt. Rev. I.	Low, G. J.
Henry's *Travels in Canada*	Bain, James (*Ed.*)
Herald (N.Y.), Origin of	Sears, G. E.
Hero of Fifty Years Ago	Scott, Mary M.
Hiawatha, Drama of	Yeigh, Frank.
Hiawatha or Manabozho	Armstrong, L. O.
Hiawatha the Great	Lighthall, W. D.
High School Course, preparation for Professions	Embree, L. E.
High School Curriculum, Defects in	Henderson, J.
High School System of Ontario, Modification of	Robertson, W. J.
High School Training in French and German	Young, A. H.
High Schools	*See* Entrance Requirements; Schools.
"Higher" Criticism, A Plea for	Morse, Chas.
Higher Criticism, A Sample of the	F., J. H.
Hildegarde	Durand, E.
Hints from a Dog	Bramble, C. A.
Historical Data, Wentworth County	Rose-Holden, Mrs. J.
Historical Notes (War of 1812)	*Anon.*
Historical Publications	Patterson, N.
Historical St. Paul's	Asling, Miss S. E.
History, Culture Value of	Carstairs, J. S.
History of Canada	Hay, G. U.
History of England	Robertson, W. F.

History of Old St. Paul's	Sweatman, Bishop.
History, Prophecy and the Monuments.	McCurdy, J. F.
History, Reading of	*Anon.*
History, Studying Early.	Campbell, C. T.
History, Teaching of.	Lang, S. E.
History, Teaching of.	Stevenson, A.
History	*See* British Columbia; Canada; Canadians; Hurons; Indians; Isle aux Noix; Isthmian Canal; Jarvis Letters; Jefferson; War of 1812.
Holmes, Oliver Wendell	Martin, C. B.
Homer, Age of.	Smith, Goldwin.
Homeric Question, The	Smith, Goldwin.
Honesty as an Only Policy	Banton, J. L.
Honeymoon in a Sailing Dinghy	"Captain."
Honour, The Decline of	Low, G. J.
Hopkin's *Progress of Canada*.	*See* Review.
Horace, Translations of.	Dole, W. P.
Horns of the Altar.	Ashmore, Annie.
House of Lords.	Coulthard, Miss G. C.
House that Jack Built.	Hazelwood, M.
Housman's *Englishwoman's Love Letters*.	*See* Review.
Hudson's Bay Company, Chronicles of.	Bradley, A. G.
Hudson's Bay Company, Twenty Years in	Campbell, R.
Hudson's Bay in Canoes.	Papineau, T. M.
Humour and Good Stories.	*Anon.*
Humorist, An Unconscious	Burpee, L. J.
Huron Villages, Notes on	Hunter, A. F.
Hurons of Lorette	Gérin, Léon.
Hutchison, last Royal Governor of Massachusetts	Withrow, W. H.
Huxley and Tyndall and Toronto University.	Macallum, A. B.
Huxley's *Life and Letters*.	*See* Review.
Hymn-Book, More Hours with	Lambly, O. R.
Hymnology of the Church.	Denyrs, T. M.
Hypnotism	*See* Suggestion.

Iconoclasm	Low, G. J.
Idylls of the King, The Women of	Rothwell, B. E.
Il Dolce Stil Nuovo	Fraser, W. H.
Immigration	*Anon.*
Immortality of the Soul.	Smith, Goldwin.
Imperial Budget, Wanted, An	MacFarlane, Thos.
Imperial Coinage, An	*Filelis.*
Imperial Court of Appeal, An.	Shannon, R. W.
Imperial Federationist, The First.	Cooper, J. A.
Imperial Parliament, An.	McGoun, Arch.
Imperial Postal and Cable Service	Fleming, Sir S.
Imperial proposals	Cates, W. G.
Imperial.	*See* Cable; Empire.
Imperialism—Quantity and Quality	Lewis, John.
Imperialism, On	Ross, H. D.
Imperialism.	*See* Annexation; British; Canada; Canadian; Salisbury.
Incompleteness	Peace, Robt.
Independence in Parliament.	*Anon.*
Independent individual effort.	McIntyre, W. A.
India, Child wives and child widows of.	Withrow, W. H.
Indian life in the great North-West	Young, E. R.
Indian occupation in Missouri.	Brown, L. D.
Indian soap, Anatomical character of	Dawson, M.
Indian village sites, Animal remains on.	Brodie, Wm.

Indians of Acadia	JACK, D. R.
Indians, Drills and drilling methods of	WINTEMBERG, W. J.
Indians, Legends of Slavey	BELL, ROBT.
Indians	*See* Crees; Heart; Hiawatha; Huron; Iroquois; Sk. qomic; Thayendanegea; Totemism; Wampum.
Industries, Copper and Nickel	HARPER, H. A.
Industries	*See* Canadian.
Industry, Agricultural	HARPER, H. A.
Industry, Fishing	HARPER, H. A.
Industry, Iron	HARPER, H. A.
Infant mind, Some phases of	BOLTON, MRS. C. E.
Inscriptions and graves, Niagara peninsula	CARNOCHAN, JANET.
Inspector, Duties of, inside school-room	MCOUAT, J. W.
Intelligence	*See* Animal.
Interest	PACKHAM, J. H.
International courtesy, Incidents of	HODGINS, J. GEO.
Introduction to *Library of Oratory*	MURRAY, J. CLARK.
Investments	THOMAS, B. H.
Iolanthe	CLARKE, C. L.
Irish Question, The	SMITH, GOLDWIN.
Iroquois of Ontario, Paganism of	BOYLE, DAVID.
Irving, Henry, as Shylock	BAIRD, FRANK.
Islander's Christmas dinner, An	ROGERS, W. W.
Isle aux Noix, History of	PATTISON, W. M.
Isle of the Massacre	WOODS, W. C.
Isthmian Canal, Diplomatic history of	MACLEOD, F. J.

Jacob the Wrestler	KENNEDY, H. D.
Japan, Civilization in	COATES, H. H.
Jarvis Letters, The	FITZGIBBON, M. A.
Jefferson, Thomas, and the L. and O. Society	RENAULT, R.
Jerusalem, Destruction of	NEWCOMB, A. F.
John, St., History of	RAYMOND, W. O.
John (Saint), The Almsgiver	DUCKWORTH, H. T. F.
Jonah on board a Man-of-war	BROWNING, ARTHUR.
Journalism, Function of, in Democracy	WILLISON, J. G.
Jubilee Convention, The	*Anon.*
Judgment, The, and the Sentence	M., W. A.

Kaffir Missionary Soga	DAVIDSON, J. W.
Kashmir	*See* Woman's Life.
Keats as Nature Poet	EDGAR, PELHAM.
Kemp, David and Andrew, Reminiscences of	GOODFELLOW, D. K.
Kindergarten, A Director's problems	AYLESWORTH, A. V.
Kindergarten, Nature Study and Manual Training	ELLIS, W. S.
Kindergarten and Primary Course	PATTERSON, MRS. S. B.
Kinetoscope, The	HODGINS, G. S.
King, The New	PATTERSON, NORMAN.
King's Birthday, The	*Anon.*
Kingston, Life in, the year after Waterloo	SHORTT, ADAM.
Kipling	CAMERON, AGNES D.
Klengersmith, Peter	KENNEY, MARGARET.
Klengersmith, Peter; or White Peter	PUGSLEY, EDWARD.
Knickerbocker, A Chat About	JONES, R. M.
Knowledge, The Diffusion of	JONES, J. W.
Knowledge, Sadness and Joy of	WATSON, PROF.
Koenig, Rudolph	LOUDON, PRESIDENT.
Kootenay Group-Drawings	CHAMBERLAIN, A. F.

Kootenay "Medicine-men."	Chamberlain, A. F.
Krag, the Kootenay Ram.	Thompson-Seton, E.
Kruger, Hofmeyr and the Bond.	Cappon, James.

Labrador: A Poem, Author of	Gagnon, Philéas.
Labrador, Life in	Grenfell, W. T.
Labour Organization in Canada	Harper, H. A.
Labour	*See* Bright; Canada; Legislation.
Lajimoniere.	*See* North-West, First Canadian Woman.
Lakes, Great, of North America	Williams, C. H.
Lamb's *Tales from Shakespeare*.	Flather, J. M. *(Ed.)*
Lampman, Archibald.	Burpee, L. J.
Lampman, Archibald.	Marshall, John.
Lampman, Philosophy of	Lewis, John.
Lampman, Poetry of.	Clawson, W. H.
Land of the Lamas.	Oxley, J. M.
Land, Robert—U. E. Loyalist.	Land, J. H.
Land Tenure in Canada.	Browne, R. H.
Landor, Walter Savage, 1775-1864.	Adam, G. M.
Landscape, The (Photography).	Johnstone, H. M.
Languages, Modern Abroad.	Fraser, W. H.
Languages, Modern, Teaching of.	Robertson, M. S.
Languages, Teaching of.	Dow, J. B.
Latin, Elementary Instruction in.	Perry, S. W.
Latin, Teaching, Aims and Methods in.	Bonis, H.
Laurier, Sir Wilfrid	Yeigh, Frank.
LaValliere of Chignecto.	Milner, W. C.
Law, Development of, during Middle Ages.	Ferguson, J. D.
Law, Martial.	Smith, Goldwin.
Law.	*See* Legal Maxims; Legal Reminiscences.
Lawrence, Joseph Wilson.	Jack, D. R.
Leaden Heel	Crompton, P.
Legal Maxims	Morse, Chas.
Legal Reminiscence, A.	Wood, S. G.
Legend of the White Reindeer	Thompson-Seton, E.
Legislation and Morality	Shortt, Adam.
Legislation in Canada for Employees about machinery	Harper, H. A.
Legislation in Canada for Employees in Mines	Harper, H. A.
Legislation in Canada for Employees in Shops	Harper, H. A.
Legislation in Canada for Employees on Railways	Harper, H. A.
Legislation in Canada for Employees on Ships	Harper, H. A.
Legislation	*See* University.
Leibnitz, Ideal Philosophy.	Chesley, E. M.
Lescarbot of Vervins, Marc.	Biggar, H. P.
Liberal Policy.	Smith, Goldwin.
Liberalism, Work of, in the Future.	Smith, Goldwin.
Libraries, Public School.	Deacon, J. S.
Libraries, School.	Harris, P. D.
Libraries, School, Care of.	*Anon.*
Library Association, Ontario, Work of.	Hardy, E. A.
Literary Agent, The.	Haultain, Arnold.
Literary Possibilities, On some	De Mille, A. B.
Literary Reminiscences	Stewart, Geo.
Literary Selections.	Houston, Wm.
Literature.	Whidden, H. P.
Literature, Imaginative, for the young.	*Anon.*

Literature in the Century	De Mille, A. B.
Literature, Poetical and Prose	Saul and McIntyre.
Little Shop at the Corner	Robson, Alma.
Little Sister at Saint's Lake	Fraser, W. A.
Lives of the Hunted	Thompson-Seton, E.
London (Ontario), Early days of	Elliot, Judge.
London, Founding of	Campbell, C. T.
London Pioneers	Carling, Sir John.
Longfellow	*See* Hawthorne.
Looking Backward	Alloway, Mary J.
Lorna Doone, Author of	Sawtell, R. W.
Lorna Doone	*See* Blackmore.
Lost Cargo	Try-Davies and Woolston.
Louisburg as it is To-day	Bryan, Claude.
Love and Company	Vernon,C. W.
Loyal and Patriotic Society	*See* Jefferson.
Loyalist, A United Empire	Barker, J. S.
Loyalists, United Empire	Bourinot, Sir J. G.
Loyalists, United Empire—German	Casselman, A. C.
Loyalists, United Empire, in 1837	Griffin, G. D.
Loyalists, United Empire, Some Presbyterian	Clendennan, D. W.
Loyalists	*See* Grant; Land, Robert.
Loyalty, A Better	Laut, Miss A. C.
Loyalty	*See* Patriotism.
Lumbering and Mining Camps	Fitzpatrick, A.
Lumbering in New Brunswick	Allen, T. J.
Lundy's Lane and Stony Creek	Anderson, M.
Lundy's Lane, Battle of	Ketchum, Mrs. Jesse.
Mackerel shark, Paired fins of	Prince, E. E., and MacKay, A. H.
Magazine, National, Purpose of	Mowat, J. Gordon.
Magazines, Making one hundred	Cooper, J. A.
Magic Key, The	Tucker, Elizabeth S.
Mahommedans	*See* Women.
Maid of Many Moods	Sheard, Virna.
Man and His Five Senses	MacLeod, R. R.
Mance, Mlle, and the Hôtel Dieu of Ville Marie	Pigeon, Mme.
Manitoba College Thirty Years Ago	Bryce, Geo.
Mansfield, M. D.	Keays, H. A.
Manual Training	Gray, P. L.
Manual Training	Kidner, T. B.
Manual Training	Leake, A. H.
Manual Training	Lucas, Aquila.
Manual Training	Robertson, J. W.
Manual Training	*Anon.*
Manual Training	*Anon.*
Manual Training, Educational significance of	Ellis, W. S.
Manual Training in Ottawa	Leake, A. H.
Manual Training Schools	Robertson, J. W.
Manual Training, Summer School of	Lucas, Aquila.
Manual Training	*See* Kindergarten.
Manufacturers' Association, Annual Address	Ellis, P. W.
Maps, Outline	*Anon.*
Marabastad	MacMechan, A.
March of the White Guard	Parker, Sir Gilbert.
March Township, Early Settlers of	Ahearn, Mrs. Thos.
March Township, Settlers of	Ahearn, Mrs. Thos.
Mark Everard	Magee, Knox.
Marquette, Father, Portrait of	Boyle, David.
Masterpiece of God, A	Baird, Frank.

Mast-Head Light in the Storm	PETITT, MAUDE.
Mathematics for Undergraduates	MURRAY, D. A.
Matriculants, Average ages of	IDINGTON, JOHN.
Matterhorn, Record climb up the	TURNER, S.
Macdonald, Professor Charles:	
Dalhousie of 1867	SMITH, E.
Dalhousie's Late Professor	GORDON, D. M.
Estimate	ANDERSON, A.
His First Day in Class	ALLAN, J. M.
His Life and Character	MACGREGOR, J. G.
In Memoriam	GRANT, G. M.
In Memoriam	MACRAE, D.
In Memoriam, C.M.	MACMECHAN, A.
Our Old Professor	FRASER, D. C.
Prof. Chas. Macdonald	FLETCHER, MARY C.
Prof. Chas. Macdonald	MURRAY, D. A.
Recollections	BELL, F. H.
Recollections	LOGAN, J. W.
Reminiscences	MACKAY, A. H.
The Teacher	WADDELL, J.
Macdonald, Sir John—Speech on Confederation	*Anon.*
MacKay, Dr. A. H.	DE MILLE, A. B.
MacLean, Kaid	EDWARDS, JAS.
McCaul, Rev. John	WEDD, WM.
McCrie's *Church of Scotland*	*See* Review.
McCurdy's *History, Prophecy and the Monuments*	*See* Review.
McIlwraith, Miss Jean	MACMURCHY, MARJORY.
McLeod, Rev. A. J.	YOUNG, A. H.
Medea of the Studio	ROGERS, C. G.
Medical	*See* University.
Medicine in Nineteenth Century, Progress of	OSLER, WM.
Medicine, Principles and Practice of	OSLER, WM.
Memnonites, Markham	ADAMS, W. H.
Memories of Old St. James'	N., J.
Mengel's *Kants Begrundung der Religion*	*See* Review.
Message to Spirit River	CAMPBELL, A. C.
Meteor King	COPLAND, J. A.
Method	PATRICK, J. N.
Methodism and City Mission Work	SHORE, T. E. E.
Methodist Ritual, Origin of	SHAW, W. I.
Metropolitan Tabernacle, A service at	BROWN, L.
Midsummer Night's True Tale	KEMPTON, JUDSON.
Militarism, Old Testament, and	SMITH, GOLDWIN.
Military Aid of the Civil Power	SMITH, HENRY.
Militia Rolls of 1866	GRIFFIN, J. A.
Militia	*See* Contingents; Law; Martial; Soldiering; South Africa; Training Camps; War of 1812.
Millenary of King Alfred the Great	INCH, J. R.
Millenary	*See* Alfred the Great.
Mind, The	WETHERALD, ETHELWYN.
Mineral Resources of Albert County	ALLEN, T. J.
Minerals of Nova Scotia	GILPIN, E.
Mines, Annual Report, British Columbia	*Anon.*
Mines, Department of, Nova Scotia	*Anon.*
Mines, Tenth Report of Ontario Bureau	*Anon.*
Mining Trip	H., O.
Minister's Self-Abnegation	HEMMEON, D.
Mint, A National	PATTERSON, N.
Misquotations	S., W. F. P.

Misquotations and Other Things	Cameron, A.
Missionary Work (Methodist)	Villard, Paul.
Missions and the Social Problems	Berry, J. P.
Missions, Romance of St. Boniface	Withrow, W. H.
Missions, Twentieth Century and	Sutherland, A.
Missions	*See* Annals; Dominica.
Monarchial Reaction	Smith, Goldwin.
Money, Paper, in modern trade	Ward, Wm.
Mongolian Question	Phillipps-Wolley, Clive.
Mongolian	*See* Chinese.
Monroe Doctrine and the Inter-Oceanic Canal	Mills, D.
Montcalm's Private Letters	"Lounger."
Montreal, 1750-1763	T., F. J.
Montreal	*See* Canada's Commercial Metropolis; Mance.
Monument, A, and its Story	Howe, Jonas.
Monument Sites	Griffin, J. A.
Moodie, Colonel Robert	Ward, Clarence.
Moose of Vermont, The last	Jack, D. R.
Moose, The	Bramble, C. A.
Mooswa and Others of the Boundaries	Fraser, W. A.
Moral Principles, Fundamental	Harper, J. M.
Morley's *Cromwell*	*See* Review.
Mother in India	Cotes, Mrs. Everard.
Mother Teal and the Overland Route	Thompson-Seton, E.
Mounds Generally	Boyle, D.
Mount Robert's summit	Baltimore, J. M.
Mourning Nation, The	"Student."
Municipal Growth in Dalhousie	Kenny, F. Gertrude.
Municipal Reform	Smith, Goldwin.
Municipal Taxation	*Anon.*
Music, Educational value of	Jenkins, Mrs. F. M.
Music, Play Methods of Teaching	Stocks, Jean.
Music	*See* Sound and Spirit.
Mysterious Manuscript	Farrell, R. B.
Naketah	Sheldrake, Sparham.
Napoleon, Birthplace of	Powell, Nonnie.
Napoleon: The Last Phase	*See* Review.
Nature Lessons, Bulletin of	Brittain, John.
Nature Lessons, Outlines of	Brittain, John.
Nature Study	Dearness, J.
Nature Study	James, B. G.
Nature Study	Sandercock, W. C.
Nature Study, Educational significance of	Ellis, W. S.
Nature Study in Primary Grades	Graham, A. S.
Nature Study, Object Lessons and	Brittain, J.
Nature Study	*See* Kindergarten.
Nawag Khan, the Gift of Allah	Fraser, W. A.
Negro Criminality	Smith, Goldwin.
Negro Problem	Smith, Goldwin.
New Brunswick, Boundaries of	Ganong, W. F.
New Brunswick, Floral Emblem for	Ganong, W. F.
New Brunswick, In the Wilds of	Oulton, M. A.
New Brunswick	*See* Public School.
New Brunswick University, Centennial of	Macklem, T. C. S.
New Brunswick University, Founders of	Dixon, Prof.
New Brunswick University, Genesis of	Raymond, W. O.
New Covenant	Ross, Anna.
New Departure	Bernard, Geo.

Newfoundland, Anglo-French Question in	McGrath, P. T.
Newfoundland or France?	Wilson, H. W.
Newfoundland Question	Willson, Beckles.
Newfoundland Seal Hunters	Harvey, John.
Newfoundland, Truth About	Willson, Beckles.
Newfoundland	*See* Railway Question.
New France, Early Trading Companies of	Biggar, H. P.
New France	*See* French Colonization; French Regime; French Settlers; Frontenac; Glorious Enterprise; La Valliere; Lescarbot; Mance; Montcalm.
New Honesty	*Anon.*
New Ontario, In the Woods of	Gordon, W. C.
New Ontario, Summer in	McKenzie, A. E. G.
New Ontario, Surveying Tour in	Grant, C. A.
New Partnership, The	Johnson, Geo.
New Year's Call	Cameron, Agnes D.
New York City, Notes taken in	Lane, C. H.
Niagara Falls, Ancient Drainage of	Currie, P. W.
Nineteenth Century	Burwash, N.
Nineteenth Century, Last of	Green, H.
Nineteenth Century, Message of	*Anon.*
Nineteenth Century	*See* Century; Dying Speeches.
Niagara Churches, Early records of	Carnochan, Janet.
Nicaragua Canal	*See* Monroe Doctrine.
Night-Hawk, The	Jones, Alice.
Nile, The English	Adams, W. H.
Nissouri	*See* Indians.
Noble Life, A	Massey, W. E. H.
Norman's Nugget	Oxley, J. M.
North American Fish and Game Protective Association	*Anon.*
North Overland with Franklin	Oxley, J. M.
North Victoria Village Sites	Laidlaw, G. E.
North-West, Field Notes from	O'Brien, J.
North-West, First Canadian Woman in	Dugast and Morice.
North-West	*See* Indian; Tree Planting; Wheat Fields.
North-Western Canada	McDougall, John.
Not Without Avail	Cragg, N. W.
Notary of Grand Pré	McLeod, A. J.
Notes on a recent examination	Waddell, John.
Notes, Random, of a Reader	Shannon, R. W.
Nova Scotia, Baronets of	Mackenzie, Sir E. M.
Nova Scotia, Builders of	Bourinot, Sir J. G.
Nova Scotia	*See* Acadians; Bank; Minerals.
Object Lessons	*See* Nature Study.
O'Connor—Diaries and Memoirs	O'Connor, D.
O'erturn o' Botany Bay	Stobo, E. J.
Official Languages, Two, in Canada	*Anon.*
Of Mirth	Haultain, Arnold.
Old Evangel and New Evangelism	Eaton, C. A.
Old Evangel and New Evangelism	Trotter, T.
Old Testament Interpretation	Jordan, Prof.
Omar Khayyam	*See* Review. (Fitzgerald).
Ontario, Exploring in	Bryan, Claude.
Ontario Game	*Anon.*
Ontario Game Laws	*Anon.*
Ontario, Old, Opening up	Macoun, John.

Ontario . . . . *See* Archæological; Bass; High School System; Public School System; Public Works; Records.
Optimistic, Pessimistic—which? . . . . Young, E. T.
Optional and Partial Courses . . . . . . *Anon.*
Oral Expression of Children. . . . . . . M., W. A.
Oratory . . . . Neely, D. J.
Orbilius, Fables of . . . . *Anon.*
Oriental. . . . . *See* University.
Ossuary in Clinton Township. . . . . . Boyle, David.
Ottawa—City of Logs and Laws . . . . Oxley, J. M.
Ottawa, Early Days of . . . . Read, Eva.
Ottawa—Fifty Years Ago. . . . . Jamieson, M.
Ottawa—The Capital. . . . . Oxley, J. M.
Ottawa. . . . . *See* Bytown; Rideau Canal.
Outcasts, The. . . . . Fraser, W. A.
Outlook for Society in 1901 . . . . Shortt, Adam.
Owen, David, of Campobello, N.B. . . Wells, Kate G.

Pabineau, Origin of Place-name . . . . Ganong, W. F.
Pair of Lunatics . . . . Bryan, Claude.
Pan-American, Failure of. . . . . Cooper, J. A.
Pandora: A Novel. . . . . Salzscheider, Mrs. A.
Parent's responsibility to the State. . Burbidge, Judge.
Parkman, Life of . . . . *See* Review.
Parliament . . . . *See* Independence; Session; Speaker.
Party Government. . . . . Richardson, R. L.
Party Government. . . . . *Anon.*
Patrick's (Saint) Day, First Observance in Canada. . . . . Sulte, B.
Patrick's (Saint) Failure, One and Singular . . . . Meehan, J. A.
Patriotic Song, A. . . . . Newell, J. R.
Patriotism in the Schools. . . . . . . Lewis, John.
Patriotism . . . . *See* American; Loyalty.
Paul's Gospel. . . . . Macnaughton, John.
Paul's (Saint) Teaching. . . . . Laird, R.
Peace, Festival of. . . . . Smith, J. V.
Peace, Paths of . . . . Barry, Lily E. F.
Peace, Victory of . . . . Sedgewick, W. H.
Peculiar People, A. . . . . Wilson, Robt.
Peep at the Other Half . . . . P., C. B.
Pennsylvania's First Explorer—Brulé . Sulte, B.
Peril on the Sea . . . . Oxley, J. M.
Perry, Commissioner . . . . Trant, Wm.
Perth-on-the-Tay. . . . . Smith, Josephine.
Pheasants in Vancouver Island. . . . Bayfield, H. A.
Phillips, Stephen . . . . Jones, G. M.
Philology in Modern Education. . . . Highest, M. E.
Philosophical speculations, Practical Results of . . . . Mersereau, C. J.
Philosophy and Classics in Ministerial Education. . . . . Milligan, G. M.
Philosophy, Outlook in. . . . . Watson, John.
Philosophy. . . . . *See* Leibnitz.
Physiological Phenomena . . . . MacMurchy, Helen.
Photographic Reminiscences. . . . . . Abbott, A. H.
Photography . . . . *See* Camera; Follow Directions; Landscape.
Physical Training . . . . *See* University.
Pine Lake. . . . . Magwood, Millie.
Pioneer Life in Eastern Townships. . . Taylor, E. M.
Place-Name Oddities. . . . . Johnson, Geo.
Place-Name. . . . . *See* Pabineau.

Plan of Campaign	Lighthall, W. D.
Players, Some Prominent	Hale, Katharine.
Plea for a Neglected Duty	Rose, S. P.
Pleonasm in the Prayer Book	Low, G. J.
Pleonasm in the Prayer Book	Petry, H. J. H.
Poetry, Art of	Brown, J. H.
Poetry	*See* Anthology; Arnold.
Poet's Sister, A.	B., J. E.
Poison Lore	Lang, W. R.
Polar Expedition	*See* Canadian.
Political Institutions of Canada	Bourinot, Sir J. G.
Political Situation in England	Smith, Goldwin.
Politics	Brown, J. H.
Politics	*See* Imperial; Independence; Liberal; Liberalism; Parliament; Party Government; Popular Government; Representation; Session; Speaker.
Popular Government, Problem of	Craick, W. A.
Port Hope: Historical Sketches	LeSueur, W. D.
Porter of Bagdad	MacMechan, A.
Postage on Periodicals	Bernard, Geo.
Post Office Reform in Victorian Era	Fleming, Sir S.
Post Office, Romance of the	Seymour, J. C.
Pounds, John—Shoemaker and Philanthropist	McCormac, G. J.
Practical Speller, Defects of	Tom, J. E.
Preaching and Pastoral Work	Dewart, E. H.
Preferential Trade	MacFarlane, Thos.
Prehistoric	*See* Aboriginal; Skulls.
Presentation at Court	Wood, Joanna E.
President, Our First (Wentworth Hist. Society)	Griffin, J. A.
Press, Shall it be Muzzled	Smith, Goldwin.
Priestly and Prophetic Historians	McFadyen, J. E.
Primary Grades, Work for	Patterson, Mrs. S. B.
Primary Lessons	Patterson, Mrs. S. B.
Prince Edward County, Settlement of	Horsey, Amy.
Prince Edward Island	*See* School System.
Prince of Good Fellows	Barr, Robt.
Printing Press in China	Hart, V. C.
Prison Problem, Our	Lavell, A. E.
Private Secretary, The	Lyons, R. N.
Prohibition	Hume, James G.
Prose Writers of Canada	Dawson, S. E.
Prose	*See* Canadian Prose.
Psychology of Childhood	Tracy, F.
Public Meetings a Necessity	Shatton, Barbara.
Public School Education in New Brunswick	Brittain, John.
Public School Regulations, Changes in	Boyd, S. J. A.
Public School System of Ontario	Millar, John.
Public School Text-Books	Black, N. F.
Public School Texts	Moore, W. F.
Public Schools, Minors Teaching in	Linton, Wm.
Public Works and Utilities of Ontario Towns	McKay, K. M.
Puisaye, Count de	Carnochan, Janet.
Pyramids, Walls and Temples, Secrets of	Macdonald, D.
Qualichan and the Cultus Trader	Sands, Harold.
Quebec, Annals of	LeMoine, Sir J. M.
Quebec, Archbishop of	Stewart, Geo.
Quebec, Attractions of	Nicholson, Byron.
Queen, Address on Death of	Peterson, W.

Queen as a Constitutional Sovereign.	Walton, F. P.
Queen, Death of	Clark, Wm.
Queen, In Memory of	Davies, N. F.
Queen, Prime Ministers of.	Colquhoun, A. H. W.
Queen, The	Burwash, N.
Queen, The	Moore, Samuel.
Queen Victoria.	*Anon.*
Queen Victoria, A Contrast.	de Soyres, J.
Queen Victoria, Elements of her greatness.	Carman, Dr. A.
Queen Victoria and the Victorian Age	Parkin, G. R.
Queen Victoria the Good	M., H.
Queen Victoria the Good	M., M.
Queen Victoria, Training of her family.	Hughes, J. L.
Queen's Name, In the	Helliwell, M. M.
Queen's (College) to His Majesty.	*Anon.*
Queen's University—A Historical Sketch.	Saunders, Lois.
Questions for the Twentieth Century	LeSueur, W. D.
Railway Policy of Canada.	McLean, S. J.
Railway Question in Newfoundland	McGrath, P. T.
Rand's *Song Waves*.	*See* Review.
Rapid Communication, Development of.	Eastman, H. M.
Reading, On	*Anon.*
Reafforesting Older Ontario.	Conant, Thos.
Recollections of a Georgia Loyalist.	Johnston, E. L.
Recollections of By-Gone Days.	Douglas, J.
Recollections of Mary Warren Breckenridge	Lefroy, C. F.
Records, Early, of Ontario.	*Anon.*
Relations between States	Oakeley, H. D.
Relic of Saint Lucia.	Griffin, J. A.
Religion, Decay of—Goldwin Smith on.	LeSueur, W. D.
Religion, Genesis and Outlook of.	Smith, Goldwin.
Religious Drift.	Withrow, W. H.
Religious Progress in XIX Century	Withrow, W. H.
Remuneration for Country School Inspectors.	Johnston, Wm.
Renfrew in the Early Days.	MacDougall, Mrs. J. L.
Representation and Taxation.	MacFarlane, Thos.
Retrospect, A.	Bailey, L. W.
Reveries of an Angler.	Beaton, W. W.

Reviews :

Bourinot's *Canada under British Rule*	*Anon.*
Bourinot's *Constitutional History of Canada*.	*Anon.*
Caine's *Eternal City*	Cooper, J. A.
Cappon's *Britain's Title in South Africa*.	Murray, J. C.
Carlyle's *Heroes and Hero-Worship*.	Falconer, R. A.
Chesnel's *La Salle*	Carstairs, J. S.
Codman's *Expedition to Quebec*.	Cruikshank, E.
Crozier's *Civilization and Progress*	*Anon.*
Crozier's *Intellectual Development*.	LeSueur, W. D.
Crozier's *Intellectual Development*.	*Anon.*
Cumberland's *Union Jack*	Carstairs, J. S.
Denison's *Soldiering in Canada*.	Withrow, W. H.
Duff's *Old Testament Theology*	Jordan, Prof. W. G.
Farnham's *Life of Parkman*	Burpee, L. J.
Fitzgerald's *Rubaiyat of Omar Khayyam*	MacGregor, R. M.
George's *Life of Henry George*	Campbell, A. C.
Gibbon's *Roman Empire*	Morse, Chas.
Gourmont's *La Culture des Idées*.	*Anon.*

Gourmont's *Esthétique de la Langue Française*	*Anon.*
Graham's *English Political Philosophy*	Morse, Chas.
Green's *William Pitt*	Carstairs, J. S.
Halsey's *Old New York Frontier*	Cruikshank, E.
Hannay's *War of 1812*	Cruikshank, E.
Hopkin's *Progress of Canada.*	Carstairs, J. S.
Housman's *Englishwoman's Love Letters.*	I.
Huxley's *Life of Huxley*	Burpee, L. J.
McCrie's *Church of Scotland*	Murray, J. C.
McCurdy's *History, Prophecy and the Monuments.*	McFadyen, J. E.
Mengel's *Kants Begrundung der Religion*	Tracy, F.
Morley's *Life of Cromwell.*	Burpee, L. J.
Rand's *Song Waves.*	Hardy, E. A.
Roosvelt's *War with U. S., 1812-1816*	Cruikshank, E.
Rosebery's *Napoleon: The Last Phase.*	Burpee, L. J.
Rosebery's *Napoleon: The Last Phase.*	Smith, Goldwin.
Rosebery's *Napoleon: The Last Phase.*	Withrow, W. H.
Royce's *World and the Individual.*	Jordan, W. G.
Saintsbury's *History of Criticism.*	*Anon.*
Salmond's *Doctrine of Immortality.*	Murray, J. C.
Schwarz's *Psychologie des Willens.*	Tracy, F.
Stephens' *Unitarians.*	Watson, John.
Thomson's *A Day's Song.*	Scott, D. C.
Townshend's *Life of Townshend*	Carstairs, J. S.
Ward's *Eleanor*	Morse, Chas.

Revolution, Rumblings of	Petitt, Maude.
Reynolds, Sir Joshua.	G., E.
Rhine, The Storied	Guerber, H. A., and Withrow, W. H.
Richmond Bay, Recollections of	Compton, H.
Rideau Canal and the Founder of Bytown.	Friel, Mrs. H. J.
Right of Way.	Parker, Sir G.
Rise in Prices.	Bernard, Geo.
Robie, Honourable Judge	Longworth, I.
Roderick Campbell	McIlwraith, J. N.
Rodney and Frances.	Eaton, O. M.
Roman Ruins (in England).	Caesar, L.
Romance of the "Killing Time."	Irwin, A. I.
Roosevelt and Canada.	Colquhoun, A. H. W.
Roosevelt's *War with U.S.*	*See* Review.
Rosebery's *Napoleon*	*See* Reviews.
Rosseau Lake, Notes from	Hamilton, J. C.
Rostand, Edmond	Willson, Miss A.
Rowing Season of 1901.	Barker, R. K.
Royal Society, The Work of	Clark, Wm.
Royal Train, The	Patterson, N.
Royal Visit, Aftermath of.	Patterson, N.
Royal Visit, The.	Grant, W. L.
Royal Visit, The.	Wright, R.
Royal Visit, Significance of.	Colquhoun, A. H. W.
Royal Visit.	*See* York, Duke of.
Royce's *World and the Individual*	*See* Review.
Rubaiyat of Omar Khayyam.	*See* Review. (Fitzgerald).
Rugby in Ontario	Clarke, C. K.
Rugby	*See* Tom Brown's School.
Rural Schools in Canada.	Robertson, J. W.
Russia, Asiatic.	Whyte, Wm.

Sabattis Christmas Dinner	McAleer, Geo.
Sabbath, Keeping the.	Smith, Goldwin.
Sailor and Saint.	Angwin, J. G.

Saintsbury's *History of Criticism* . . . . *See* Review.
Salisbury's Imperialism. . . . . MacFarlane, T.
Salmond's *Doctrine of Immortality*. . . . *See* Review.
Salt Lake City . . . . Withrow, W. H.
Sardine Industry. . . . . Bensley, B. A.
Savings Bank, Romance of the. . . . . Seymour, J. C.
Scadding, Late Reverend Henry. . . . *Anon.*
Scholar or something more . . . . . . Laidlaw, T.
School as preparation for Practical Life. . . . . Smith, E.
School, Attention in. . . . . Bridges, H. S.
School Hygiene. . . . . MacMurchy, Helen.
School in Norfolk, The First . . . . . . Walsh, F. L.
School in Talbot District, The First . . Evans, F.
School Inspector, Duties of. . . . . . . Parker, John.
School Problem. . . . . Arnett, J. H.
School System (Prince Edward Island). Warburton, A. B.
Schools, German. . . . . Riddell, J. H.
Schools, Patriotism in. . . . . Murray, Mrs. J. C.
Schools, Sexless . . . . Silcox, S.
School. . . . . *See* Bible; Christian; College; Drawing; Economics; Education; Elementary Schools; English Composition; High School; Kindergarten; Libraries; Literary Selections; Literature; Manual Training; Nature Study; Optional Courses; Patriotism; Public Schools; Rural Schools; Student; Teacher; Technical Schools; Training Schools; University; Voluntary Schools.
Schopenhauer, Introduction to His Writings . . . . Hume, J. G.
Schwarz's *Psychologie des Willens* . . . . *See* Review.
Science, ... Dupuis, Prof.
Science Building, New (Toronto University). . . . . Coleman, Prof.
"Scotsman.". . . . . Cameron, A.
Scott's *Lay of the Last Minstrel* . . . . Alexander, W. J. (*Ed.*)
Scott's *Lay of the Last Minstrel* . . . . Reynal, A. H. (*Ed.*)
Scott's Women. . . . . M., B.
Sea Urchin, Food of. . . . . Scott, F. H.
Secord, Laura, The Story of . . . . . . Currie, Mrs.
Selections in Poetical and Prose Literature . . . . Saul, J. C.
Servos Family, Memorials of. . . . . . Kirby, Wm.
Session of 1901 (Canadian Parliament). Ruthven, E.
Shakespeare, Development in Plays of. Martin, C. B.
Shakespeare or Bacon? The Bi-Literal Cipher. . . . . Steele, W. M.
Shakespeare, The Real . . . . S., W. F. P.
Shakespeare. . . . . *See* Comic Element.
Shelley and Keats as Nature Poets . . Edgar, Pelham.
Shipping upon the Great Lakes . . . . Bill, I. E.
"Shirley" and Yorkshire in 1812. . . . Low, G. J.
Shore and Camp Fire. . . . . I., E. W.
Single or Double Entry (Book-keeping) Johnston, G. L.
Single Tax, Progress of. . . . . Campbell, A. C.
Sk.qomic of British Columbia, The. . . Hill-Tout, C.
Skulls taken from Prehistoric Mounds. Blue, A.
Sky-Pilot's Parish, Scenes from . . . . Bengough, J. W.
Smith, Goldwin, at the Grange. . . . . Oxley, J. M.
Smith's Knoll, Historic Value of. . . . Mills, G. H.
Smugglers, A Night with. . . . . Morrison, F. A.

Snakes' Paradise	Fraser, W. A.
Social Problem, The	Menge, G. J.
Social Problem	*See* Church; Missions.
Social Reform	*See* Prohibition.
Socrates, his Person and Work	Dyde, Prof. S. W.
Soldiering in Canada	Denison, G. T.
Sophocles	Robinson, P. J.
Sound and Spirit	Jeffers, T. C.
South Africa and Canadian Manufactures	Cummings, J.
South Africa, Sketches from	Ross, A. E.
South Africa, With the Guns in	Morrison, E. W. B.
South Africa	*See* Britain's Title; Canadian Contingents; War.
Sower of Wheat, A	Bindloss, H.
Spanish Documents relating to Canary Islands	Campbell, J.
Speaker and House of Commons	Bain, Thos.
Speech of Rev. Major Smith	*Anon.*
Spelling Reform	Low, G. J.
Spelling Reform	*Anon.*
Split Infinitive, The	*Anon.*
Spooks—An Incident of the Last Century	Caius, A. W.
Sprachkenntnisse Al Mittel Zur Geistesbildung	Mueller, P. W.
Spring, The, that did not fall	Cox, W. S.
Spurgeon, C. H.	Adams, H. F.
Stability and Progress	Porter, T. W.
Staël-Holstein, Madame de	Norton, J. M.
Statistical Year-Book	Johnson, Geo.
Steel Bridge and Structural Works	Brydone-Jack, E.
Steel-Making in Cape Breton	McGrath, P. T.
Steel	*See* America.
Stephen's *Utilitarians*	*See* Review.
Stevenson, Robert Louis	Seeton, Miss E.
Stevenson, Robert Louis, The Art of	Macnaughton, John.
Stoney Creek (War of 1812)	*See* Lundy's Lane.
Story of Im	Farrant, H.
Strachan, Bishop, Reminiscences of	Cartwright, C.
Strathcona and Mount Royal, Lord	Withrow, W. H.
Strength	Browne, A. F.
Strenuous Life, The	Champion, J. B.
Student Life, Incidents of	*Anon.*
Students and the New Century	Foster, Geo. E.
Studies for Little Folks	Patterson, Mrs. S. B.
Sudermann, Hermann	Jones, Miss L. L.
Suggestion, Fundamental Problems of	Kirschman, A.
Summers are Long, Where	Mowat, J. G.
Swinburne, Algernon Charles	Wood, Joanna E.

Teacher, What he can do for the Farmer	Marshall, G. R.
Teachers' Examinations, Notes on	Hay, G. U.
Teachers, Professional Training of	McIntosh, A.
Teachers, To	Smith, Goldwin.
Teachers, Training, in Ontario	MacCabe, J. A.
Teachers	*See* Dominion; Education; Schools.
Technical Schools	Cross, I. E.
Temagami Lake Reserve	*Anon.*
Tennyson's Ministers	Holling, T. E.
Tennyson	*See Idylls of the King.*
Territorial Trust, Our	Hartwell, G. E.
Tertullian	*See* Anti-Rationalism.

Text-Book Problem	MacMurchy, A.
Text-Book Question	Young, A. H.
Thayendanegea, Relic of	Rose-Holden, Mrs. M. E.
Theological Faculties, Mission of.	Lang, A. E.
Theology, Nineteenth Century	Burwash, N.
Theology, Old Testament.	Jordan, Prof.
Theology, Principles of Pauline.	Thomas, Ernest.
Theology, Testament: Gould	Cross, G. W.
Thomson's *A Day's Song*.	*See* Review.
Thornton, Matthew, Signature of	Vroom, James.
Tiberius: A Character Sketch.	Bennett, C. V.
Tientsin, Siege of	Hand, T. W.
'Tilda Jane.	Saunders, Marshall.
Time, The Question of.	Brittain, John.
Tom Brown's School.	MacMurchy, Marjory.
Toronto.	Hughes, J. L.
Toronto University	*See* Huxley and Tyndall; Science Building.
Torrington, F. H.	Godfrey, H. H.
Totemism in the Old Testament	Murison, R. G.
Totemism, Origin of, British Columbia.	Hill-Tout, C.
Touring a Continent.	Patterson, N.
Townshend's *Life of Townshend*.	*See* Review.
Trade War between Great Britain and America.	B., G.
Trades Unions	*See* Economics.
Traditions of Early Acadians.	Bambrick, J.
Training a Pupil to Compare	Waddell, John.
Training Camps, Practical observations on.	Hunter, A. T.
Training Schools, Course of Studies in.	Dearness, J.
Translation.	*See* Büchter.
Trapper's Camp, How to build.	Risteen, F. H.
Tree Planting in the North-West	Mitchell, A.
Trees and Forests.	V.
Trees and Shrubs, Native.	Muldrew, W. H.
Trees, Destruction of.	Hamilton, D. W.
Trees, Shade, Planting of.	Macoun, W. T.
Trees.	*See* Forestry.
Trinity University Year-Book.	Mackenzie, M. A. (*Ed.*)
Trip down the Bay	Tracy, W. L.
Trout, Hatching and Planting of.	Prince, E. E.
Tyndall at Toronto University	Macallum, A. B.
Twain, Mark, as the American Conscience..	Cappon, James.
Twentieth Century, The Question for	Campbell, A. C.
Twentieth Century.	*See* Century.
Unanswered Letter, The.	Browning, Arthur.
United States relations with Canada	*Anon.*
United States.	*See* Canada.
Universities, Commericial Education at	Wickett, S. M.
Universities, Object of	Smith, Goldwin.
University Act, 1901.	Paterson, J. A.
University and State Aid.	Loudon, President J.
University and State Aid.	Meredith, Sir R.
University and the Schools.	Watson, Prof. John.
University Bill, The	Burwash, Chancellor.
University Building, Story of a.	Cumberland, B.
University Confederation	Smith, Goldwin.
University Consolidation	Murray, W. C.
University (of Toronto), Early days of.	Boys, W. F. A.
University Education for the Clergy.	Clark, Prof. Wm.
University Endowments.	Hodgins, Thos.
University Extension.	Hodgins, J. G.

University Grants, Legislation and	Young, Prof. A. H.
University Monopoly	Shortt, Prof. Adam.
University, Oriental	Clark, W. M.
University, Physical Training at	Crawford, H. J.
University, preparation for Legal Profession	Lefroy, Prof.
University Question, Symposium on	*Anon.*
University Question, The	Dyde, Prof. S. W.
University Question, The	Grant, Principal G. M.
University Question, The	G.
University Question, The	Loudon, President J.
University Question, The	*Anon.*
University Reform	Graduate.
University Social Life, Value of	Wallace, Chancellor O. C. S.
University Starvation	Fairclough, H. R.
University, Training for Medical Profession	Hunt, Lewis.
University, The King and the	Cooper, J. A.
University, The Needs of	MacLennan, S. F.
University	*See* American; Entrance Requirements; New Brunswick; Toronto; Victoria.
Unposted Letter, An	McTavish, N.
Upper Canada College, Roll of Pupils	*Anon.*
Upper Canada, Early Immigration into	Northwood, M. A.
Upper Canada, First Parliament of	Kerr, Edith.
Upper Canada, Founding of	Watson, Ella.
Utopia	*See* Britain.
Valentine's Day, Saint	Devlin, H. S.
Victoria	*See* Queen.
Victoria University, Reminiscences of	Doxsee, E. R.
Victors, The	Barr, Robt.
Viking's Vision, The	Plant, V. L.
Virgil, The Study of	Stoddart, R.
Vittoria in 1842	Wilson, Elizabeth.
Voluntary Schools	Burritt, J. H.
Voyageurs, The Migration of, in 1828	Osborne, A. C.
Wales, Prince of, Visit to Canada	Lancefield, R. T.
Wampum records of the Ottawas	Hunter, A. F.
Wanted—An humble Man	M.
War of the Future, The	MacMurchy, A.
War, Sick and Wounded in	Mattress, W.
War Sketches	McKinnon, H. V.
War, The, and its opponents	Smith, Goldwin.
War	*See* South Africa; Working Men.
War of 1812, An Incident of	Smith, W. H.
War of 1812, Canadian Regiments in	Cruikshank, E.
War of 1812, Effect of on Canada	McConnell, Mrs. R. G.
War of 1812, History of	Hannay, James.
War of 1812	*See* Chrysler's Farm; Historical Notes; Lundy's Lane; *Reviews*; Secord.
Ward's, Mrs., *Eleanor*	*See* Review.
Washington, Booker T., Life Story of	Withrow, W. H.
Waterways and Water-power of Canada	*Anon.*
Wayside Inn at Sudbury	Osborne, W. F.
Wealth and its Uses	Seymour, J. C.
Wellington	Smith, Goldwin.
Wesley, Charles	Seymour, J. C.
Wesley, John, Churchmanship of	Harrison, W.
Wesley Portraits, The New	Withrow, W. H.
West, The, as a field of labour for Eastern men	Tighe, W. B.

Western Canada, Women's Work in.	Lewthwait, E.
Western Watch-fires, By.	Petitt, Maude.
Westminster, A Visit to.	Carman, A. R.
Wetmore Family, The.	Jack, D. R.
Wheat Crop, Evolution of.	Bindloss, Harold.
Wheatfields of Canadian North-West	Macoun, John.
Where the Sugar Maple Grows.	Teskey, A. M.
Where west is east and east is west	Cameron, Agnes D.
White Flag, The.	Dickson, James.
White House, The Lady of	Withrow, W. H.
White Man's Burden	Welch, G. R.
White's *Natural History of Selborne*	Allen, Grant (*Ed.*)
Whitman, Walt, Poet and Seer.	Brown, J. H.
Whitmore family of Niagara.	Kirby, Wm.
Who's Hatch?	Oxley, J. M.
Why Not Sweetheart?.	Henshaw, Julia W.
Wild Animal Play.	Thompson-Seton, Ernest.
Wild Animals, Pictures of	Thompson-Seton, Ernest.
Wild Geese, Shooting, in New Brunswick.	Silver, A. P.
Wild Heart of Man, The	Lewis, John.
Wild Motherhood.	Roberts, C. G. D.
Willie Winkie	Shaw, C. L.
Wilson, Sir Daniel, A biographical sketch	Langton, H. H.
Winchester and the Millenary	Burwash, E. M.
Winslow Papers, The	Raymond, W. O.
Winter's Walk in Canada.	Haultain, Arnold.
Witnesses, Rights of.	Reid, R. A.
Wolfe—Did he take Quebec?	Colquhoun, A. H. W.
Wolves on the range	Innes, John.
Woman in the Snow, The.	Stringer, A. J.
Woman, Of such is the nature of	Graham, Eric.
Woman's Life for Kashmir, A	Withrow, W. H.
Women Among Mahommedans.	Rogers, R. V.
Women, Higher Education of.	Chown, Alice A.
Women in China, Legal position of.	Rogers, R. V.
Women.	*See Idylls of the King.*
Woodcock.	Bramble, C. A.
Wooden relics.	Laidlaw, G. E.
Woollen Industry	Alexander, C. J.
Words of Counsel	Robertson, J. C.
Wordsworth—A Study.	Stewart, Miss M.
Work and Discipline	Allin, Arthur.
Working Men and the War.	Smith, Goldwin.
Worthy of his Hire	Young, E. Ryerson.
Yachting season of 1901.	Campbell, F. J.
Yale Bicentenary.	Harrison, Thos.
Year-Book of St. Paul's.	Armitage, W. J.
Yellow Point Mound.	Boyle, David.
York	*See* Duke; Royal Visit; Touring a Continent.
Young, George Paxton.	Duncan, J. M.
Young, Prof., in the Lecture Room.	Blake, W. H.
Young Martinet, The	Hart, P. W.
Young.	*See* Literature.
Yukon River Tragedy	Woodside, H. J.
Zeta Psi at Toronto.	Moss, C. A.

POETRY.

Alien's Farewell, The	Thomson, J. S.
Alone	Plant, V. L.
At Yuletide	Parkinson, Amy.
At Yule-Tide	MacDonald, Elizabeth R.
Autumn Hymn, An	Lockhart, A. J.
Ave	"Viator."
Ballad	De Mille, A. B.
Boswell	Wetherald, E.
Bounty	Clarke, G. H.
Britain	Campbell, W. W.
Canada	Manks, Herbert L.
Canadian Battlefields	Wilkinson, J. R.
Canadian Crystals	Watson, Thos.
Christmas Pean, A	Gadsby, Franklin.
City Children	De Mille, A. B.
Class Ode	Steele, Wm.
Coming of Winter, The	Scott, D. C.
Dead Queen, The	Mainer, R. H.
Death and a Child	Stringer, A. J.
Death in Winter, A	De Mille, A. B.
Deserted Wharf, The	Roberts, C. G. D.
Dryad's House, The	Campbell, W. W.
Eastertide	Blewett, Jean.
Empire's Call, The	Robinson, Jessie.
End of Song, An	Lockhart, A. J.
Enoch	Parkinson, Amy.
Ether Music	Liffiton, Florence.
Evening	Lepage, Thos.
Farewell to the Old Year	Liffiton, Florence.
Fathers, The	Lockhart, A. J.
From My Window	Wetherald, Ethelwyn.
Fugitive	Stringer, A. J.
George Martin	Lockhart, A. J.
Glad New Year, A	Parkinson, Amy.
Glen Ella	Campbell, W. W.
God Shall Supply all Your Need	Parkinson, Amy.
God's Discipline	Jones, Ralph M.
Grant Us Thy Peace	Ware, Emily A.
Grave of the Year, The	Morton, Irene E.
Greater Glory, The	Speer, J. C.
Greeting to the King, A	Godfrey, H. H.
Have the Birds Come?	Lockhart, A. J.
Heart Cry, A	Lawson, Frank.
Hepaestus	Stringer, A. J.
His Great Love	Parkinson, Amy.
House of Song, The	Campbell, W. W.
Humming Bird on its Nest	Wetherald, Ethelwyn.
If Meat Offend	Salt, Silas.
In August's Glare	MacDonald, Elizabeth R.
In the Beginning	Wright, R. W.
In the Morning	Parkinson, Amy.
In the Orchard	Roberts, C. G. D.
In the Wych-Wood	Merrill, Helen M.
Indian Lullaby, An	Bryan, Claude.
Intendant Talon's Farewell, The	Allison, W. T.
Interpretation	Edgar, W. W.
Johnnie Courteau	Drummond, W. H.
Johnnie's First Moose	Drummond, W. H.
Last Night and its Vision, The	Lauder, Mrs. de Touffe.
Last Songs from Vagabondia	Carman, Bliss.
Life and Art	Roberts, C. G. D.

Life's Stream	Lough, Helen B.
Little Bateese	Drummond, W. H.
Lord is Thy Keeper, The	Parkinson, Amy.
Love Song	Scott, D. C.
Love Song, A	Scott, D. C.
Man	Morse, Inglis.
Man	Rogers, C. G.
May and June	Carman, Bliss.
Memories	Copeland, Agnes G.
Memories	Ragg, Alban E.
Meskeek-Uum-Pudas	Clark, J. S.
Migration	Lockhart, A. J.
Months, The	Thomson, J. S.
Mother Carey's Chickens	Roberts, Theodore.
Mountain, The	Speer, J. C.
My All in All	Laycock, J.
Nahe Des Geliebten	Kerr, W. A. R.
New Year	Durand, Evelyn.
Nicotine Ballad, A	P., W.
Night, A Sonnet	Martin, Martha.
Northern Reverie, A	Stringer, A. J.
Northman's Welcome	Lough, Helen B.
Nought but Sleep	Petitt, Maude.
November	Allen, A. W.
Ode on Burial of Queen Victoria	Grote, G. W.
Old Quebec	Arbory, John.
On a Child's Portrait	Stringer, A. J.
On a Chopin Nocturne	Stringer, A. J.
On the Sunset Sea	Copeland, Agnes G.
Our Heritage	Campbell, W. W.
Parting Year, The	Lockhart, A .J.
Passing Year, The	Jones, Mabel V.
Pictor Ignotus	Carman, Bliss.
Pioneers, The	Rogers, W. W.
Pipers of the Pool	Roberts, C. G. D.
Poems	Lampman, Archibald.
Poems	Roberts, C. G. D.
Poems and Lectures	Leitch, P. J.
Poems by a Business Man	Tyrrell, Wm.
Poems of a Great Range	Stickle, C. H.
Point of View	Carman, Bliss.
Price, The	Wetherald, Ethelwyn.
Prince George	Godfrey, H. H.
Prisoned Flowers	M., T.
Quatrains	Edgar, W. W.
Quebec Cathedral	Bellingham, H. G.
Queen's Soliloquy, The	Copeland, Agnes G.
Quid Mihi Adfers?	Lepage, Thos.
Response, The	Pennington, Amy K.
River Song, A	Durand, Evelyn.
Rose of Life	Roberts, C. G. D.
Sailing North	Roberts, Theodore.
Sea by the Wood, The	Scott, D. C.
Sea-Song, A	MacKay, Isabella E.
September	Campbell, W. W.
Sir Ector to the Dead Knight	Roberts, Theodore.
Song	Martin, Martha.
Song in October	Stringer, A. J.
Song in Spring, A	Low, May A.
Song in the Night, The	Parkinson, Amy.
Song Sparrow, The	Lockhart, A .J.
Sonnets	Campbell, W. W.
Spec-Age	McGill, Wm.
Star in the East, The	Bishop, M. B.

Stars of the East, The	Wright, R. W.
Summer Clouds	Ford, Arthur R.
Summer Flowers	B., J. S.
Sunset	Cleveland, B. M.
Sunset at Chambly	Low, May A.
Tecumseh and Canadian Poems	Mair, Charles.
Tidings of Olaf	Carman, Bliss.
To Count Tolstoi	Ragg, Alban E.
To My Lassie	A., E. D.
To the New Year	Lepage, Thos.
To the Twentieth Century	Gadsby, Franklin.
To Time	Wetherald, Ethelwyn.
Toast to the King	Selwyn, Cecil E.
Tribute, A	Rogers, Amy.
Triumph, A	Johnston, A. J.
Truth Shall Make You Free, The	Gilroy, W. E.
Twin Flowers on the Portage	Scott, D. C.
Two Beggars	Wetherald, Ethelwyn.
Two Pictures	Lepage, Thos.
Two Summer Eves	Lepage, Thos.
Vanguard, The	Campbell, W. W.
Victor and other Poems	Lehigh, M. S.
Victoria	Lockhart, A. J.
Victoria Emanuel	Grote, G. W.
Victoria Regina	Campbell, W. W.
Wallace and Canada	Campbell, John W.
War	Low, May A.
War Spirit	Stringer, A. J.
Way of Beauty, The	McInnes, T. R. E.
Welcome to Duke of York	Scott, D. C.
Wind	Campbell, W. W.
Wisdom of Love	Roberts, C. G. D.

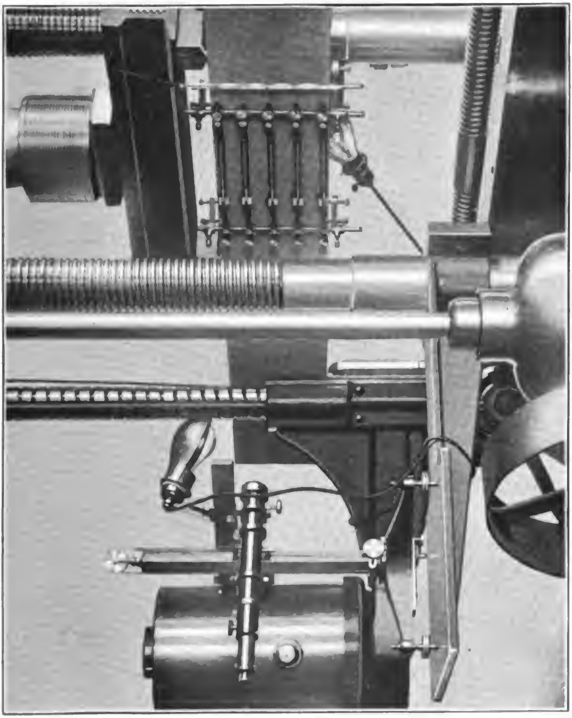
ROYAL SOCIETY OF CANADA

TRANSACTIONS

SECTION III.

MATHEMATICAL, PHYSICAL AND CHEMICAL SCIENCES

PAPERS FOR 1902



PHOTOGRAPH SHOWING EXTENSOMETERS IN PLACE ON SIDE OF CAST STEEL BEAM.

.—*On the Stresses Developed in Beams Loaded Transversely.*

By HENRY T. BOVEY, F. R. S.

(Read May 27, 1902.)

The present paper contains further results obtained with the new extensometer described in Section III., Vol. VII., of the "Transactions" of the Royal Society of Canada, in the year 1901–02.

The loading was of the same description and of two kinds, namely, (1) loads of increasing magnitude were placed at the centre; and (2) equal loads of increasing magnitude were concentrated at two points equidistant from the centre, the maximum B. M. in each case being the same as for the corresponding centrally placed load.

In all measurements, the beams were placed on supports 60 ins. apart and the distance between the extensometer points was 8 ins.

In each set of observations, the horizontal row at the top of the columns gives the loads successively placed on the beam, and the columns under the several loads give the corresponding changes of length between the extensometer points in millions of an inch, each change of length being the average obtained from five to ten observations.

The decrements and increments of length are indicated by negative and positive signs respectively.

A.—EXPERIMENTS WITH AN 8 IN. STEEL ROLLED JOIST WEIGHING 49⅝ LBS. PER LINEAL YARD.

An extensometer was placed horizontally at the centre of gravity of the section and extensometers were also placed on parallel lines at distances of 1·27 ins., 2·54 ins. and 3·81 ins., above and below the centre of gravity, the extensometers in the last case being on the flanges.

LOADS CONCENTRATED AT 30-IN. CENTRES.

3,000 lbs.	6,000 lbs.	9,000 lbs.	12,000 lbs.	15,000 lbs.
— 935	— 1701	— 2415	— 3126	— 3824
— 641	— 1228	— 1778	— 2325	— 2840
— 323	— 617	— 903	— 1101	— 1460
— 6	+ 2	+ 13	+ 22	+ 25
+ 311	+ 627	+ 937	+ 1239	+ 1536
+ 631	+ 1256	+ 1863	+ 2446	+ 3008
+ 891	+ 1682	+ 2478	+ 3252	+ 4038

By plotting the above results, diagram I. is obtained.

DIAGRAMS FOR 8IN. ROLLED JOIST

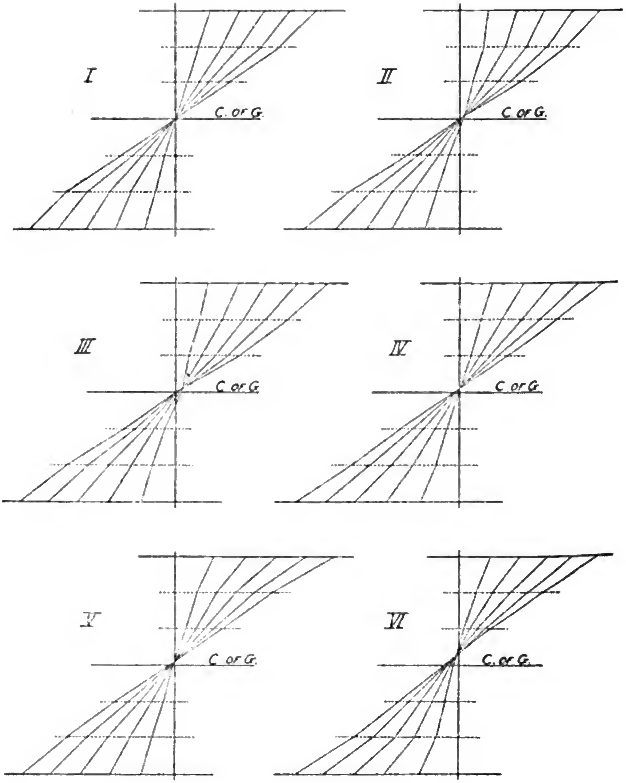


TABLE OF MAXIMUM BENDING MOMENTS AND DEFLECTIONS.

Load in lbs.	Max. Bending Moment in in.-lbs.	Deflections in inches.
3000	45000	·011
6000	90000	·024
9000	135000	·038
12000	180000	·051
15000	225000	·063

LOADS CONCENTRATED AT 20-IN. CENTRES.

2,250 lbs.	4,500 lbs.	6,750 lbs.	9,000 lbs.	11,250 lbs.
— 778	— 1582	— 2384	— 3208	— 4075
— 645	— 1265	— 1860	— 2452	— 3027
— 337	— 679	— 1014	— 1350	— 1671
— 10	— 38	— 69	— 100	— 133
+ 306	+ 597	+ 887	+ 1172	+ 1452
+ 637	+ 1257	+ 1870	+ 2475	+ 3068
+ 942	+ 1840	+ 2664	+ 3404	+ 4268

By plotting the above results, diagram II. is obtained.

TABLE OF MAXIMUM BENDING MOMENTS AND DEFLECTIONS.

Load in lbs.	Max. Bending Moment in in.-lbs.	Deflections in inches.
2250	45000	·013
4500	90000	·015
6750	135000	·017
9000	180000	·019
11250	225000	·021

SERIES I.

LOADS CONCENTRATED AT 30-IN. CENTRES.

800 lbs.	1,600 lbs.	2,400 lbs.	3,200 lbs.	4,000 lbs.
− 87	− 174	− 269	− 361	− 457
− 38	− 81	− 122	− 170	− 211
+ 0	+ 1	+ 4	+ 6	+ 8
+ 34	+ 97	+ 142	+ 197	+ 240
+ 92	+ 205	+ 310	+ 412	+ 515

By plotting the above results, diagram VII. was obtained.

TABLE OF MAXIMUM BENDING MOMENTS AND DEFLECTIONS.

Load in lbs.	Max. Bending Moment in in. lbs.	Deflections in inches.
800	12000	·001
1600	24000	·0015
2400	36000	·003
3200	48000	·0045
4000	60000	·0055

SERIES II.

1,600 lbs.	3,200 lbs.	4,800 lbs.	6,400 lbs.	8,000 lbs.
− 183	− 377	− 575	− 760	− 935
− 78	− 166	− 263	− 357	− 447
+ 6	+ 8	+ 8	+ 7	+ 7
+ 92	+ 188	+ 280	+ 375	+ 473
+ 202	+ 405	+ 601	+ 789	+ 975

By plotting the above results, diagram VIII. was obtained.

Table of Maximum Bending Moments and Deflections.

Load in lbs.	Max. Bending Moment in in. lbs.	Deflections in inches.
1600	24000	·002
3200	48000	·004
4800	72000	·007
6400	96000	·0085
8000	120000	·011

SERIES III.

2,400 lbs.	4,800 lbs.	7,200 lbs.	8,60 lbs.	12,000 lbs.
— 272	— 559	— 840	— 1120	— 1383
— 119	— 242	— 368	— 493	— 616
+ 8	+ 17	+ 26	+ 37	+ 49
+ 145	+ 297	+ 417	+ 602	+ 757
+ 304	+ 605	+ 901	+ 1176	+ 1440

By plotting the above results, diagram IX. was obtained.

Table of Maximum Bending Moments and Deflections.

Load in lbs.	Max. Bending Moment in in.-lbs.	Deflections in inches.
2400	36000	·003
4800	22000	·006
7200	108000	·010
9600	144000	·014
120000	180000	·017

SERIES IV.

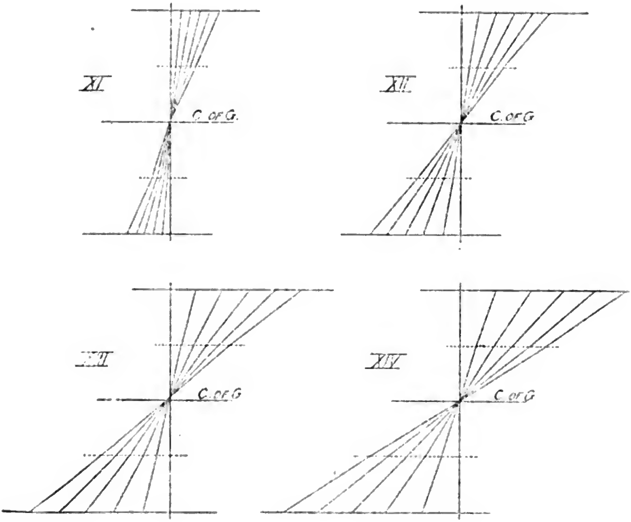
3,200 lbs.	6,400 lbs.	9,600 lbs.	12,800 lbs.	16,000 lbs.
— 387	— 763	— 1116	— 1438	— 1767
— 172	— 360	— 545	— 724	— 900
+ 8	+ 2	+ 13	+ 15	+ 35
+ 184	+ 370	+ 578	+ 780	+ 990
+ 398	+ 795	+ 1177	+ 1551	+ 1913

By plotting the above results, diagram X. was obtained.

TABLE OF MAXIMUM BENDING MOMENTS AND DEFLECTIONS.

Load in lbs.	Max. Bending Moment in in.-lbs.	Deflections in inches.
3200	48000	·004
6400	96000	·009
9600	144000	·013
12800	192000	·018
16000	240000	·028

DIAGRAMS FOR CAST-STEEL BEAM WITH LOADS
CONCENTRATED AT 20 IN. CENTRES



SERIES I.

LOADS CONCENTRATED AT 20 IN. CENTRES.

600 lbs.	1 200 lbs.	1,800 lbs.	2,400 lbs.	3,000 lbs.
— 104	— 212	— 318	— 421	— 521
— 58	— 112	— 168	— 218	— 272
— 2	— 3	— 6	— 12	— 15
+ 35	+ 70	+ 119	+ 155	+ 202
+ 86	+ 185	+ 286	+ 379	+ 475

By plotting the above results, diagram XI. was obtained.

TABLE OF MAXIMUM BENDING MOMENTS AND DEFLECTIONS.

Load in lbs.	Max. Bending Moment in in. lbs.	Deflections in inches.
600	12000	·001
1200	24000	·002
1800	36000	·0035
2400	48000	·005
3000	60000	·0055

SERIES II.

1,200 lbs.	2,400 lbs.	3,600 lbs.	4,800 lbs.	6,000 lbs.
— 188	— 378	— 577	— 765	— 942
— 81	— 168	— 265	— 361	— 451
+ 7	+ 3	+ 4	+ 2	+ 4
+ 89	+ 187	+ 276	+ 368	+ 467
+ 195	+ 403	+ 599	+ 799	+ 980

By plotting the above results, diagram XII. was obtained.

TABLE OF MAXIMUM BENDING MOMENTS AND DEFLECTIONS.

Load in lbs.	Max. Bending Moment in in. lbs.	Deflections in inches.
1200	24000	·001
2400	48000	·003
3600	72000	·0055
4800	96000	.0075
6000	120000	·0094

SERIES III.

1,800 lbs.	3,600 lbs.	5,400 bs.	7,200 lbs.	9,000 lbs.
− 279	− 566	− 851	− 1132	− 1406
− 126	− 254	− 383	− 512	− 638
+ 2	+ 10	+ 16	+ 24	+ 32
+ 143	+ 296	+ 445	+ 596	+ 747
+ 299	+ 603	+ 889	+ 1175	+ 1453

By plotting the above results, diagram XIII. was obtained.

TABLE OF MAXIMUM BENDING MOMENTS AND DEFLECTIONS.

Load in lbs.	Max. Bending Moment in in.-lbs.	Deflections in inches.
1800	36000	·003
3600	72000	·006
5400	108000	·009
7200	144000	·012
9000	180000	·015

SERIES IV.

2,400 lbs.	4,800 lbs.	7,200 lbs.	9,600 lbs.	12,000 lbs.
− 381	− 761	− 1116	− 1447	− 1781
− 168	− 361	− 549	− 742	− 919
+ 9	+ 3	+ 8	+ 6	+ 10
+ 190	+ 369	+ 572	+ 77	+ 969
+ 406	+ 80	+ 1178	+ 154	+ 1906

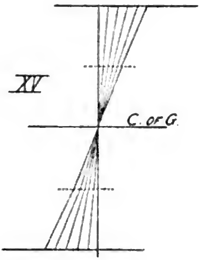
By plotting the above results, diagram XIV. was obtained.

TABLE OF MAXIMUM BENDING MOMENTS AND DEFLECTIONS.

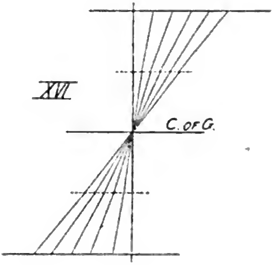
Load in lbs.	Max. Bending Moment in in.-lbs.	Deflections in inches.
2400	48000	·004
4800	96000	·009
7200	144000	·013
9600	192000	·017
12000	240000	·021

DIAGRAMS FOR CAST-STEEL BEAM WITH LOADS CONCENTRATED AT 15 IN. CENTRES

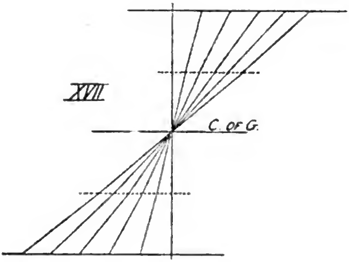
XV



XVI



XVII



SERIES I.

LOADS CONCENTRATED AT 15-IN CENTRES.

535 lbs.	1,070 lbs.	1,605 lbs.	2,140 lbs.	2,675 lbs.
— 92	— 191	— 281	— 380	— 475
— 47	— 095	— 138	— 189	— 236
+ 1	+ 1	+ 1	+ 1	+ 1
+ 39	+ 84	+ 135	+ 178	+ 229
+ 94	+ 196	+ 307	+ 407	+ 506

By plotting the above results, diagram XV. was obtained.

TABLE OF MAXIMUM BENDING MOMENTS AND DEFLECTIONS.

Load in lbs.	Max. Bending Moment in in.-lbs.	Deflections in inches.
535	13138	·001
1070	26276	·002
1605	39414	·003
2140	52552	·004
2675	65690	·005

SERIES II.

1,070 lbs.	2,140 lbs.	3,210 lbs.	4,280 lbs.	5,350 lbs.
— 190	— 387	— 581	— 771	— 946
— 84	— 172	— 272	— 369	— 460
+ 6	+ 2	+ 1	+ 1	+ 0
+ 86	+ 183	+ 275	+ 365	+ 464
+ 196	+ 406	+ 602	+ 797	+ 982

By plotting the above results, diagram XVI. was obtained.

TABLE OF MAXIMUM BENDING MOMENTS AND DEFLECTIONS.

Load in lbs.	Max. Bending Moment in in.-lbs.	Deflections in inches.
1070	26276	·001
2140	52552	·003
3210	78828	·0055
4280	105104	·0075
5350	131380	·010

SERIES III.

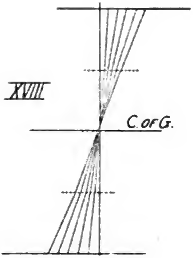
1,605 lbs.	3,210 lbs.	4,815 lbs.	6,420 lbs.	8,025 lbs.
— 284	— 572	— 850	— 1110	— 1359
— 129	— 167	— 416	— 555	— 692
+ 3	+ 6	+ 5	+ 4	+ 10
+ 144	+ 285	+ 425	+ 577	+ 726
+ 312	+ 614	+ 912	+ 1189	+ 1470

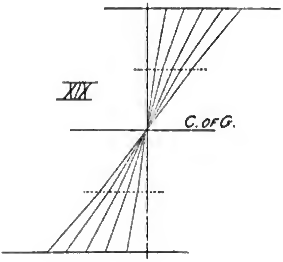
By plotting the above results, diagram XVII. was obtained.

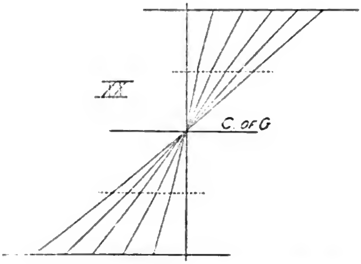
TABLE OF MAXIMUM BENDING MOMENTS AND DEFLECTIONS.

Load in lbs.	Max. Bending Moment in in.-lbs.	Deflections in inches.
1605	39414	·003
3210	78828	·006
4815	118242	·009
6420	157656	·013
8025	197070	·016

DIAGRAMS FOR CAST·STELL BEAM WITH LOADS
CONCENTRATED AT 8IN. CENTRES







SERIES I.

LOADS CONCENTRATED AT 8-IN. CENTRES.

460 lbs.	920 lbs.	1,380 lbs.	1,840 lbs.	2,300 lbs.
— 86	— 181	— 268	— 365	— 456
— 41	— 86	— 123	— 171	— 213
+ 3	+ 4	+ 6	+ 7	+ 8
+ 40	+ 89	+ 138	+ 194	+ 238
+ 101	+ 206	+ 316	+ 413	+ 515

By plotting the above results, diagram XVIII. was obtained.

TABLE OF MAXIMUM BENDING MOMENTS AND DEFLECTIONS.

Load in lbs.	Max. Bending Moment in in.-lbs.	Deflections in inches.
460	11960	·001
920	23920	·0015
1380	35880	·002
1840	47840	·003
2300	59800	·004

SERIES II.

925 lbs.	1,840 lbs.	2,760 lbs.	3,680 lbs.	4,600 lbs.
— 185	— 364	— 557	— 746	— 920
— 77	— 156	— 248	— 336	— 434
+ 4	+ 15	+ 12	+ 18	+ 13
+ 90	+ 199	+ 287	+ 381	+ 476
+ 200	+ 413	+ 608	+ 801	+ 990

By plotting the above results, diagram XIX. was obtained.

TABLE OF MAXIMUM BENDING MOMENTS AND DEFLECTIONS.

Load in lbs.	Max. Bending Moment in in.-lbs.	Deflections in inches.
920	23920	·002
1840	47840	·0045
2760	71760	·0065
3680	95680	·0085
4600	119600	·010

SERIES III.

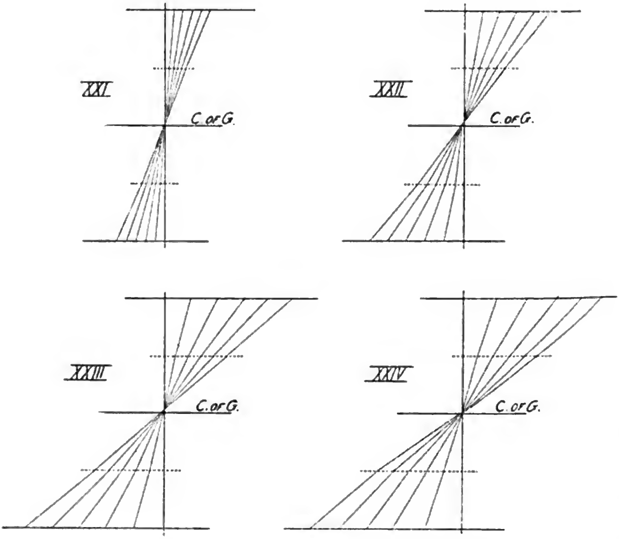
2,380 lbs.	2,760 lbs.	4,140 lbs.	5,520 lbs.	6,900 lbs.
− 274	− 559	− 836	− 1090	− 1333
− 117	− 248	− 389	− 525	− 662
+ 7	+ 12	+ 10	+ 16	+ 15
+ 145	+ 289	+ 424	+ 575	+ 720
+ 307	+ 610	+ 903	+ 1176	+ 1451

By plotting the above results, diagram XX. was obtained.

TABLE OF MAXIMUM BENDING MOMENTS AND DEFLECTIONS.

Load in lbs.	Max. Bending Moment in in. lbs.	Deflections in inches.
2380	35880	·004
2760	71760	·007
4140	107640	·010
5520	143520	·012
6900	179400	·014

DIAGRAMS FOR CAST-STEEL BEAM WITH LOADS CONCENTRATED AT 6IN. CENTRES



SERIES I.

Loads Concentrated at 6-in. Centres.

445 lbs.	890 lbs.	1,335 lbs.	1,780 lbs.	2,220 lbs.
— 93	— 189	— 283	— 379	— 470
— 41	— 86	— 126	— 171	— 216
+ 1	+ 2	+ 4	+ 6	+ 8
+ 40	+ 87	+ 137	+ 189	+ 335
+ 95	+ 195	+ 299	+ 401	+ 501

By plotting the above results, diagram XXI. was obtained.

TABLE OF MAXIMUM BENDING MOMENTS AND DEFLECTIONS.

Load in lbs.	Max. Bending Moment in in. lbs.	Deflections in inches.
445	12015	·001
890	24030	·002
1335	36045	·003
1780	48060	·004
2225	60075	·005

SERIES II.

890 lbs.	1,780 lbs.	2,670 lbs.	3,560 lbs.	4,450 lbs.
— 182	— 365	— 556	— 743	— 917
— 75	— 151	— 239	— 331	— 419
+ 7	+ 17	+ 21	+ 19	+ 24
+ 94	+ 97	+ 291	+ 383	+ 480
+ 201	+ 415	+ 612	+ 806	+ 992

By plotting the above results, diagram XXII. was obtained.

TABLE OF MAXIMUM BENDING MOMENTS AND DEFLECTIONS.

Load in lbs.	Max. Bending Moment in in.-lbs.	Deflections in inches.
890	24030	·003
1780	48060	·005
2670	72090	.007
3560	96120	·009
4450	120150	·011

SERIES III.

1,335 lbs.	2,670 lbs.	4,050 lbs.	5,340 lbs.	6,675 lbs.
— 274	— 553	— 836	— 1078	— 1325
— 115	— 244	— 381	— 514	— 645
+ 10	+ 17	+ 19	+ 23	+ 29
+ 146	+ 288	+ 431	+ 578	+ 723
+ 305	+ 613	+ 897	+ 1167	+ 1445

By plotting the above results, diagram XXIII. was obtained.

Table of Maximum Bending Moments and Deflections.

Load in lbs.	Max. Bending Moment in in.-lbs.	Deflections in inches.
1335	36045	·004
2670	72090	·007
4050	108135	·009
5340	144180	·013
6675	180225	·016

SERIES IV.

1,665 lbs.	3,330 lbs.	4,895 lbs.	6,660 lbs.	8,325 lbs.
— 340	— 683	— 997	— 1285	— 1573
— 166	— 314	— 493	— 645	— 778
+ 9	+ 21	+ 30	+ 47	+ 58
+ 197	+ 374	+ 570	+ 733	+ 893
+ 389	+ 732	+ 1002	+ 1294	+ 1594

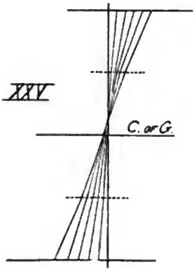
By plotting the above results, diagram XXIV. was obtained, but only one series of observations was made in this case.

TABLE OF MAXIMUM BENDING MOMENTS AND DEFLECTIONS.

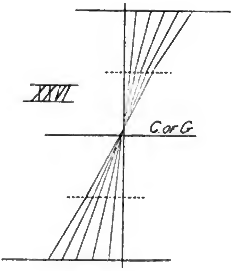
Load in lbs.	Max. Bending Moment in in.-lbs.	Deflections in inches.
1665	36045	·007
3330	72090	·010
4995	108135	·013
6660	144180	·017
8325	180225	.020

DIAGRAMS FOR CAST-STEEL BEAM WITH LOADS
CONCENTRATED AT CENTRE

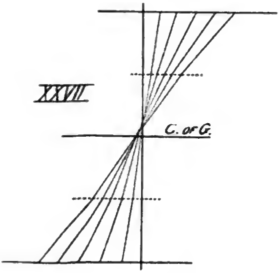
XXV



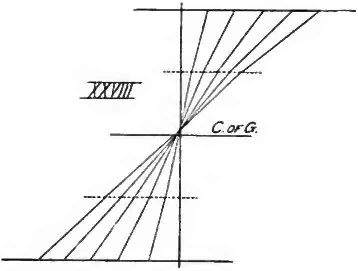
XXVI



XXVII



XXVIII



SERIES I.

LOAD CONCENTRATED AT CENTRE.

800 lbs.	1,600 lbs.	2,400 lbs.	3,200 lbs.	4,000 lbs.
— 81	— 169	— 245	— 330	— 417
— 33	— 64	— 93	— 124	— 164
+ 5	+ 6	+ 13	+ 28	+ 35
+ 38	+ 89	+ 141	+ 203	+ 255
+ 87	+ 185	+ 287	+ 398	+ 507

By plotting the above results, diagram XXV. was obtained.

TABLE OF MAXIMUM BENDING MOMENTS AND DEFLECTIONS.

Load in lbs.	Max. Bending Moment in in.-lbs.	Deflections in inches.
800	12000	·001
1600	24000	·002
2400	36000	·003
3200	48000	·004
4000	60000	·005

SERIES II.

1,200 lbs.	2,400 lbs.	3,600 lbs.	4,800 lbs.	6,000 lbs.
— 113	— 253	— 381	— 517	— 657
— 52	— 100	— 158	— 206	— 273
+ 3	+ 13	+ 28	+ 28	+ 30
+ 61	+ 140	+ 228	+ 294	+ 356
+ 133	+ 286	+ 450	+ 586	+ 715

By plotting the above results, diagram XXVI. was obtained.

TABLE OF MAXIMUM BENDING MOMENTS AND DEFLECTIONS.

Load in lbs.	Max. Bending Moment in in.-lbs.	Deflections in inches.
1200	1800	·002
2400	3600	·004
3600	5400	·005
4800	7200	·006
6000	9000	·008

SERIES III.

1,600 lbs.	3,200 lbs.	4,800 lbs.	6,400 lbs.	8,000 lbs.
− 172	− 338	− 519	− 706	− 886
− 71	− 133	− 211	− 296	− 376
+ 3	+ 22	+ 29	+ 27	+ 29
+ 83	+ 194	+ 292	+ 376	+ 468
+ 183	+ 396	+ 586	+ 760	+ 933

By plotting the above results, diagram XXVII. was obtained.

TABLE OF MAXIMUM BENDING MOMENTS AND DEFLECTIONS.

Load in lbs.	Max. Bending Moment in in.-lbs.	Deflections in inches.
1600	24000	·002
3200	48000	·003
4800	72000	·005
6400	96000	·006
8000	120000	·008

SERIES IV.

2,400 lbs.	4,800 lbs.	7,200 lbs.	9,600 lbs.	1,200 lbs.
— 251	— 514	— 790	— 1060	— 1330
— 103	— 213	— 342	— 460	— 581
+ 14	+ 35	+ 36	+ 41	+ 46
+ 141	+ 297	+ 432	+ 567	+ 706
+ 290	+ 588	+ 853	+ 1111	+ 1352

By plotting the above results, diagram XXVIII. was obtained.

TABLE OF MAXIMUM BENDING MOMENTS AND DEFLECTIONS.

Load in lbs.	Max. Bending Moment in in.-lbs.	Deflections in inches.
2400	36000	·003
4800	72000	·006
7200	108000	·010
9600	144000	·014
12000	180000	·017

An inspection of diagrams VII. to XXIV., for the cast steel beam, shows that in all cases the stresses in the material are very approximately proportional to the distance from the neutral surface and that this neutral surface very approximately coincides with the centre of gravity, indicating that, in the case of the concentrated loads, the variation of stress in the beam in question is closely in accordance with theory.

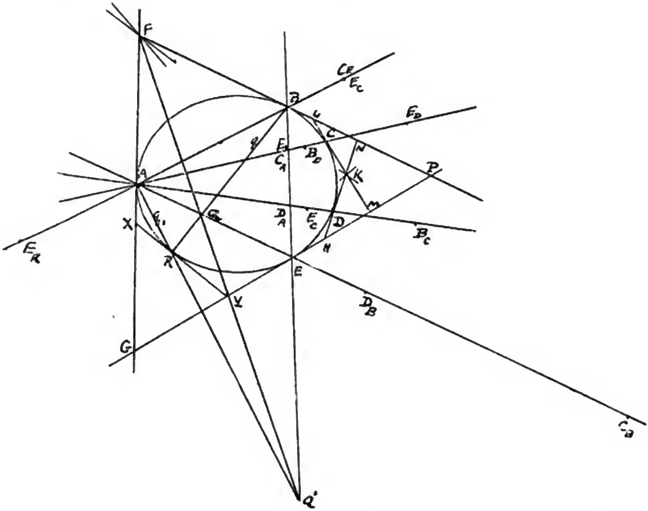
In diagrams XV. to XXVIII., plotted from the results obtained for a beam loaded at the centre, the neutral surface has very appreciably moved towards the compression side, but the stress in the material is still proportional to the distance from the neutral surface in its changed position.

II.—*Correlation of the Curve of the Second Order and the Sheaf of Rays of the Second Order in Geometry of Position.*

By Professor **ALFRED BAKER**, M.A., of University of Toronto.

(Read May 27, 1902.)

As a convenient notation, C_A is used to denote the projection of C from A.



To obtain tangents at A and B, A and B are taken as radiant points, and AE and BE as base lines, and C is projected on these from A and B, giving C_A, C_B; also D is projected from A and B, giving D_A, D_B. The intersection of $C_A\,C_B$ and $D_A\,D_B$ gives F, the intersection of the tangents at A and B.

Again, to find the tangent at E, A and E are taken as radiant points and $A\,B$, $E\,B$ as base lines. The projections of C are C_A and C_E. On $C_E\,C_A$ the intersection of the tangents at A and E lies. Hence, finding G, the intersection of $C_E C_A$ with tangent at A, we have the point through which the tangent at E passes.

To find tangents at C and D, take C and D as radiant points and $C\,A$, $D\,A$ as base lines. Then projecting B from C and D we get B_C and B_D; and projecting E from C and D we get E_C and E_D. The intersection K, of $B_C\;B_D$ and $E_C\;E_D$, gives the intersection of the tangents at C and D.

Again, taking B and C as radiant points, and $A\,B$, $A\,C$ as base lines, and projecting E from these points, we get E_C, E_B, which are the same as C_E, C_A. Hence the intersection of tangents at B and C lies on $C_A\;C_E$, on which also lies the intersection of the tangents at A and E. Similarly the intersection of tangents at C and E lies on $C_A\;C_B$, on which also lies the intersection of tangents at A and B.

We thus see that if a quadrilateral be described about a conic, the intersection of lines joining opposite points of contact ($B\,E$ and $A\,C$) is also the intersection of lines joining opposite intersections of tangents ($G\,L$ and $F\,M$).

Next consider the five tangents (at A, B, C, D, E) as rays of a sheaf of the second order. Take F and G as radiant points and $F\,P$, $G\,P$ as base lines. Sheaves from F and G will be in perspective. But $G\,L$ and $F\,M$ intersect at C_A, and $F\,H$ and $G\,N$ intersect at D_A. Hence $B\,E$ is the line on which corresponding lines from F and G intersect, and B and E are "points of contact."

Hence when five points are given (which uniquely determine a curve of the second order), and the construction for tangents at these five points is made, the five tangents, regarded as the basis of a sheaf of rays of the second order and uniquely determining the sheaf of rays, have for "points of contact" the five original points.

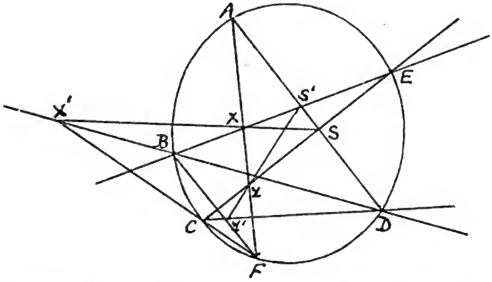
Again, A and B being radiant points, and $A\,E$, $B\,E$ base lines, if any ray, q, be given, we construct for q_1, the ray corresponding to q, and so get R, a sixth point on the curve of the second order.

To construct tangent at R, take A and R as radiant points, and $A\,B$, $R\,B$ as base lines. Then projecting E on these lines from A and R, we get Q and E_R. The intersection of $Q\,E_R$ with the tangent at A gives X, and enables us to draw the tangent at R.

But this tangent (at R) is a ray of the set of five tangents, viewed as a sheaf of rays of the second order. For it is also got by projecting Q, a point on $A\,E$ (which is the line joining "points of contact" on $F\,G$, $P\,G$), from P and F on the base lines $F\,G$, $P\,G$, since P, Q, X are in the same straight line, and also F, Q, Y in the same straight line.

It has thus been proved that the "tangents" at points of a curve of the second order form a sheaf of rays of the second order, and the points at which the tangents are drawn are the "points of contact" for the rays of this sheaf of the second order.

I add the following proof of the uniqueness of the curve of the second order, whatever five points on the curve be selected as the base of the construction and whichever of these be taken as the radiant points:



First let A, B, C, D, E be the five points, and A and C the radiant points. Then the curve is unique, *i.e.*, only one curve exists with A and C as radiant points; or, to put it more clearly, if a given ray from A be selected, say $A\ X$, to this corresponds only one ray from C, the intersection of these rays giving a point on the curve.

But the question arises,—if we take two other of the five points as radiant points shall we get the same succession of curve-points?

To answer this, construct first the point F, A and C being radiant points and $B\ E$, $B\ D$ base lines. Then S is the point from which the ranges $B\ E$ and $B\ D$ are in perspective. Thus $A\ F$ and $C\ F$ are corresponding rays.

Next take A and B as radiant points, and $C\ E$ and $C\ D$ as base lines. Then S^1 is the point with respect to which the ranges $C\ E$ and $C\ D$ are in perspective. The same ray $A\ X$ is taken from A, and the question is, will the corresponding ray, now from B, intersect it in the same point F. This corresponding ray is evidently $B\ Y^1$.

Then considering the triangles $X\ B\ X^1$ and $Y\ Y^1\ C$, the corresponding sides $B\ X$, $Y^1\ Y$ intersect in S^1, the sides $X^1\ X$, $C\ Y$ in S, and the sides $X^1\ B$, $C\ Y^1$ in D. But S^1, S and D are in the same straight line. Hence $X^1\ C$, $B\ Y^1$ and $X\ Y$ intersect in F.

Take now another point E, say, as radiant point instead of A, and the intersection of the ray $B\ F$ from B, with the corresponding ray from E, will, by what has just been proved, give the same point F.

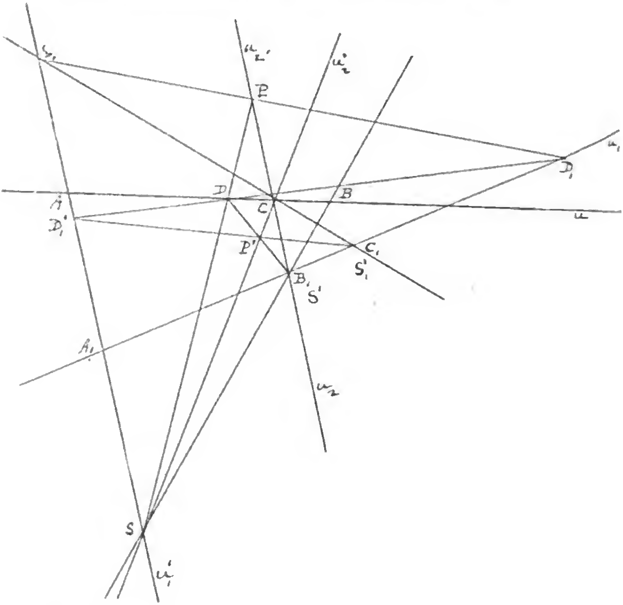
Thus any pair of the five points may be taken as radiant points, and the same points will make up the curve, since a ray in the direction of F will always be intersected at F by the corresponding ray, and F represents any point on the curve.

Hence the curve through the five points A, B, C, D, E is unique, and does not depend on the particular pair selected as radiant points.

Next let the curve through A, B, C, D E be constructed, and on it select *any* five points. Take any two of these as radiant points and suppose the curve constructed. This must be the curve first constructed, since only one curve can pass through the second five points, and the original curve does this.

An analogous proof applies to the uniqueness of the sheaf of rays of the second order, whatever five rays of the sheaf be selected as the base of the construction and whichever of these be taken as the base lines.

The following is the figure correlative to the preceding:



The five rays which form the base of the construction are u, u_1, $A\ A_1$, $B\ B_1$ and $C\ C_1$. Then u, u_1 being the base lines, and S, S_1 the radiant points, $C\ B_1$ or u_2 is the perspective axis. Hence, given a point D on u, we construct at once the corresponding point D_1 on u_1, and the new ray $D\ D_1$ is reached.

Then retaining u as a base line, let $A\ A_1$ or u^1_1 be the other. Also B_1 and C_1 being the new radiant points, $S\ C$ or u^1_2 is the new perspective axis.

Hence, given a point D on u, we construct at once the corresponding point D^1_1 on u^1_1, and the new ray $D\ D^1_1$ is reached.

But this ray $D\ D^1_1$ is the same as the preceding $D\ D_1$. For the triangles $P\ S\ S_1$ and $S^1\ P^1\ S^1_1$ are such that the lines joining corresponding points P and S^1, S and P^1, S_1 and S_1^1, pass through the same point C. Hence the intersections of corresponding sides $P\ S$ and $S^1\ P^1$, $S\ S_1$ and $P^1\ S_1^1$, $S_1\ P$ and $S_1^1\ S^1$, *i.e.*, the points D, D_1^1 and D_1, all lie on the same straight line. That is the new rays $D\ D_1$ and $D\ D_1^1$ are identical And from this point the proof proceeds as in the preceding demonstration.

III.—*On the Determination of Moisture in Honey.*

By FRANK T. SHUTT, M.A., F.I.C., F.C.S.,

AND

A. T. CHARRON, M.A.

(Read May 27, 1902.)

The investigation which gave rise to the work recorded in this paper was undertaken to ascertain what difference in composition—if any—existed between honey extracted from capped and uncapped comb. Apiarists term the latter immature or unripe honey and contend that it is of a thin and inferior quality and, therefore, when placed upon the market apt to injure the sale of mature or ripe honey taken from fully capped comb. Further, it is held that "unripe" honey materially affects the latter's keeping quality.

Among the first determinations attempted was that of the water-content of the honeys, and the difficulties that were at once met with in obtaining results of a concordant and reliable character led us to examine the various methods now in vogue for estimating moisture in such saccharine substances.

DRYING ON ASBESTOS IN GLASS TUBES AT APPROXIMATELY 98° C., IN STEAM BATH.

In all essential features, this method is that recommended by Macfarlane for estimating moisture in milk, butter, and many other articles of food that are already fluid or can be readily brought into this condition. The honey was weighed in a weighing bottle and then washed out into a 100 c.c. graduated flask and made up to the containing mark. An aliquot part of the solution was run into each tube containing a sufficiency of asbestos to act as an absorbent. The tubes were then dried in racks in a steam oven at atmospheric pressure and maintained at a temperature of (approximately) 98° C. We presume that this is essentially the method and modus operandi followed in obtaining the greater number of the results recorded in the Bulletin (No. 47) on honey, issued by the Inland Revenue Department, Canada.

Unfortunately, this convenient method proved exceedingly unsatisfactory, it being found impossible to obtain constant results. The longer the period of drying, the greater the loss. Even after 5 days drying, the tubes continued to lose in weight—due, undoubtedly, to the continued decomposition (dehydration) of the levulose, which constitutes practically 50 per cent of the saccharine matter of honey.

In the following table we have arranged the moisture-content of 12 samples of honey as determined at the expiration of 48 hours, 72 hours, and 96 hours. In the first series each tube received 20 c.c. of an approximately 20 per cent solution, and in the second series, 10 c.c. of an approximately 5 per cent solution. The percentages of moisture, as calculated from the specific gravity determination [1] are also given.

TABLE I. MOISTURE IN HONEY, AS DETERMINED IN STEAM BATH AT 98° C.

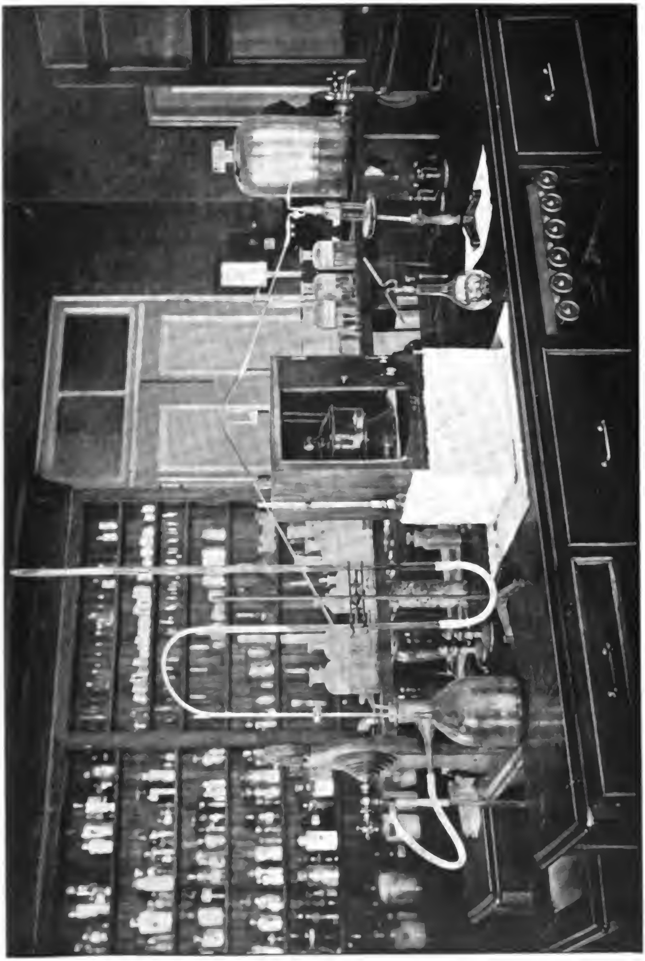
HONEY FROM	No.	From 20% (approximately) solution			From 5% (approximately) solution		Calculated from Sp. Gr. of diluted honey
		48 Hours	72 Hours	96 Hours	48 Hours	72 Hours	
Fully capped comb	1	21·91 20·30	22·82 22·19	24·17 22·98	23·40 25·68	25·40 26.48	17·93
	2	21·86 21·17	22·38 21·89	23·38 23.13	25·80 26.28	26·20 26·50	17·88
	3	21·56 20·56	23·29 21·44	24·01 22·76	29·40 28·24	30·80 29·72	18·76
	4	24·43 23·00	24·48 23·70	26·27 25·53	28·94 29·10	30·70 31·10	19·55
Partially capped comb	5	25·05 24·78	26·91 25·78	27·73 26·93	29·78 31·16	31·54 32·28	19·49
	6	27·29 27·56	27·86 28·50	29·37 29·49	32·08 32·18	33·80 33·30	22·29
	7	28·41 27·59	29·57 28·50	30·86 29·59	33·80 32·08	35·88 34.36	23·27
	8	25·65 26·14	27·59 27·63	27·66 28·14	32.10 33·00	33.90 35·72	23·92
Uncapped comb	9	23·68 23·96	24·86 24.63	25·47 25·32	30·40 28·56	31·76 30·04	19·57
	10	22·82 23·07	24·10 23·98	24·88 24.97	28·54 28·48	29·34 30·36	18·25
	11	23·34 22·87	24·65 24·19	25·73 25.91	27·58 28·76	29·76 29·60	19·24
	12	25·59 26·65	27·06 28·10	27·68 28·58	32·26 32·90	32·86 34·22	22·69

---

[1] In all the estimations of moisture and solids as calculated from the specific gravity of the diluted honey (taken at 15·5°C), the following formula has been employed :—

$$W = \frac{D - 1000}{3{\cdot}85 \times M}$$

W = Per cent of solids in honey.
D = Density of diluted solution of honey.
3·85 = Increase of density for each 1 gram of sugar or other carbo-hydrate in 100 c.c. of the liquid.
M = Grams of honey in 100 c.c. of diluted solution.



Apparatus used in Determining Moisture in Honey

A detailed consideration of the data is unnecessary, but the more important deductions from them may be briefly stated as follows:

1. That, assuming the results from the specific gravity determination to be approximately correct, a drying period of 48 hours at 98° C. gives too high a percentage of moisture, the excess being about 5 per cent.

2. That the longer the drying period, the greater the loss; that is, the decomposition of the levulose is continuous. This fact, that it is practically impossible to dry to a constant weight, is in itself sufficient to condemn the method.

3. That higher percentages of water are obtained from the 5 per cent than from the 20 per cent solutions of honey, showing that there is a more rapid decomposition of the levulose when using the more dilute solution.

DRYING ON ASBESTOS IN GLASS TUBES AT 70° C. TO 75° C. IN STEAM BATH.

Our next step was to ascertain the moisture-content, drying between 70° C. and 75° C.— the other conditions being the same as in the first series. Each tube contained 10 c.c. of an approximately 12 per cent solution of honey. The samples, though corresponding with those of the first series, were not identical with them.

TABLE II. MOISTURE IN HONEY, AS DETERMINED IN STEAM BATH AT 70° C TO 75° C. SOLUTION, APPROXIMATELY 12 PER CENT.

HONEY FROM	No.	20 Hours	27 Hours	31 Hours	36 Hours	Calculated from Sp.Gr. of diluted honey
Fully capped comb	1	19·36 19·95	19·82 20·29	20·03 20·50	20·07 20·90	15·46
	2	19·52 18·78	19·87 18·88	19·99 19·24	20.00 19·42	16·95
	3	20·63 19·59	20·52 20·16	21·29 20·67	21·51 20·44	15·89
	4	20·20 20·07	20·59 20·66	21·12 20·75	20·91 21·07	15·84
Partially capped comb	5	23.00 22·13	23·49 22·39	23.87 22·67	23·71 23·12	19·12
	6	24·89 25·41	25·19 25·87	25·44 26·21	25·46 25·91	20·63
	7	25·23 24·96	25·46 25·26	25·85 25·91	26·19 26·18	20·68
	8	23·45 24·00	23·88 24·06	24·59 24·78	24·73 25·33	21·03

TABLE II. MOISTURE IN HONEY, AS DETERMINED IN STEAM BATH AT 70° C. TO 75° C. SOLUTION, APPROXIMATELY 12 PER CENT.—*Concluded.*

HONEY FROM	No.	20 Hours	27 Hours	31 Hours	36 Hours	Calculated from Sp. Gr. of diluted honey
Uncapped comb	9	21·20	21·77	21·69	22·09	17·83
		21·46	21·56	21·81	21·62	
	10	21·26	21·73	21·61	22·00	16·59
		20·69	20·93	21·09	21·00	
	11	21·52	21·79	22·05	22·14	39·42[1]
		21·70	22·21	22·34	22·09	
	12	20·24	21·11	21·30	20·86	41·20[1]
		20·40	21·01	21·18	21·22	

[1] Found to be slightly fermented.

From these data we note that drying even at this lower temperature (70° C.— 75° C.) for a period of 20 hours, gives results much higher than those obtained from the specific gravity estimations; and, further, the percentages of moisture — or rather of loss — increase with continued heating, though not so rapidly as when a temperature of 98° C. is used (see Table I.).

DRYING ON (*a*) ASBESTOS, AND (*b*) SAND, IN PLATINUM DISHES, IN PARTIAL VACUUM AT 70° C.

The apparatus used in these trials was exceedingly simple. A tubulated desiccator was placed inside the steam bath (the same as used in the foregoing experiment) and connected as shown in the illustration with an exhaust pump attached to the water service. With a current of dry air at the rate of one bubble per second being drawn through the desiccator, a vacuum of approximately 8 inches was maintained. The temperature of 70° C. was without difficulty kept constant for a week or more at a time by almost filling the bath with water and arranging a series of small gas jets (from an S-burner) at a distance of 3 to 4 inches from the bottom of the bath. The flames were protected from draughts by a casing of asbestos board.

The absorbent materials were sand and asbestos, and platinum dishes (flat and round bottoms) were used in the place of glass tubes.

TABLE III. MOISTURE IN HONEY, FROM FULLY CAPPED COMB, AS DETERMINED IN PARTIAL VACUUM AT 70° C.

Solution A: 60·9166 grms. honey in 500 c.c. (approximately 12%).
Solution B: 25·3596 grms. honey in 500 c.c. (approximately 5%).
Moisture in honey, as calculated for Sp. Gr. of A=17·88%.
Moisture in honey, as calculated for Sp. Gr. of B=17·46%.

ABSORBENT MATERIAL	Shape of Dish	From Solution A				From Solution B			
		24 Hours	48 Hours	72 Hours	96 Hours	24 Hours	48 Hours	72 Hours	96 Hours
Sand	F.B.	17·91	18·20	18·67	18·88	17·00	17·94	17·94	18·22
	R.B.	17·97	18·24	18·94	19·63	16·17	17·12	17·12	17·45
Asbestos	F.B.	20·14	20·83	21·20	21·73	22·48	24·89	25·75	26·82
	R.B.	20·16	20·75	21·20	21·98	22·83	24·18	25·24	26·15

To compare these results with those obtained by the method previously used, solutions A and B (using 10 c.c. in each estimation) were dried at atmospheric pressure in the steam bath (98° C.) on asbestos in glass tubes, when the following moisture percentages were obtained:

	24 hrs.	48 hrs.	72 hrs.	96 hrs.
Solution A	23·75	26·40		
	24·71	27·12		
Solution B	22·98	30·21	33·92	35·24
	22·20	29·62	32·06	34·05

We now present data of a similar character to those in Table III., but from honey taken from uncapped comb.

TABLE IV. MOISTURE IN HONEY, FROM UNCAPPED COMB, AS DETERMINED IN PARTIAL VACUUM AT 70° C.

Solution: 25·0872 grms. honey in 500 c.c. (approximately 5%).
Moisture in honey, as calculated from Sp. Gr.=22·35%.

ABSORBENT MATERIAL	Shape of Dish	24 Hours	48 Hours	72 Hours	96 Hours
Sand	F.B.	21·34	22.65	23·37	23·69
	R.B.	21·52	23·03	23·51	23·90
Asbestos	F.B.	28·45	31·52	33·04	33.32
	R.B.	28·33	31·36	33·04	33·32

The comparative data, drying at 98° C. in steam bath, using asbestos in glass tubes, are as follows:—

	24 hrs.	48 hrs.	72 hrs.
Percentage of Moisture	31·34	36·25	40·01
" "	31·90	36·90	40·53

DRYING ON (*a*) ASBESTOS, AND (*b*) SAND, IN PLATINUM DISHES, IN PARTIAL VACUUM AT 60° C.

In all respects, save that of temperature, the conditions of drying were identical with those of the preceding series. The results, given in Table V., appear to show that at this lower temperature (60° C.) 24 hours drying is sufficient for perfect desiccation. As at 70° C., however, the percentages obtained by drying on asbestos are somewhat higher than those when sand is used.

TABLE V. MOISTURE IN HONEY, FROM FULLY CAPPED COMB, AS DETERMINED IN PARTIAL VACUUM AT 60° C.

Solution: 59·8312 grms. honey in 500 c.c. (approximately 12%).
Moisture in honey, as calculated from Sp. Gr.=17·08%.

ABSORBENT MATERIAL	Shape of Dish	24 Hours	48 Hours	96 Hours
Sand	F.B.	16·88	17·13	17·28
	R.B.	17·62	17·84	18·04
Asbestos	F.B.	18·88	19·24	19·65
	R.B.	18·65	19·20	19·52

The same solution dried on asbestos in glass tubes at 98° C. gave the following results:—

	24 hrs.	48 hrs.	72 hrs.	96 hrs.
Percentage of moisture . .	26·27	29·21	30·67	32·26
" "	24·66	27·26	28·90	30·33

A review of the results in the foregoing tables allows us to conclude:—

(1) That in drying a solution of honey in glass tubes on asbestos, a temperature of 98° C. at atmospheric pressure induces a considerable and continuous dehydration of the levulose, resulting in an apparent loss of moisture far exceeding the real amount present.

(2) That drying in glass tubes on asbestos at atmospheric pressure between 70° C. and 75° C. also occasions a decomposition of the levulose of the honey. It will not suffice, therefore, if accurate results are to be obtained, simply to lower the temperature of the steam bath as in the second series of experiments.

(3) That drying in platinum dishes on sand in a partial vacuum (8 inches) at a temperature of 60° C. to 70° C. for 24 hours to 48 hours, yields results in close accord with those calculated from the specific gravity determinations — and that a more prolonged drying is undesirable, as such appears to induce a slight decomposition of the levulose.

(4) That drying on asbestos yields much higher results than drying on sand. This, apparently, is as true at 60° C. as at 70° C. (see Tables IV. and V.) and indicates a peculiar property or quality of the asbestos in inducing decomposition of the levulose.

(5) That there were no differences of note between the results from drying in round and flat bottom platinum dishes.

ON THE BEHAVIOUR OF MIXTURES (SOLUTIONS) OF DEXTROSE AND LEVULOSE UNDER VARYING CONDITIONS OF DRYING.

As the saccharine matter in honey consists almost entirely of dextrose and levulose, existing in practically equal proportions, it was considered desirable to ascertain the effect of drying solutions of such a mixture, employing methods involving the same conditions of temperature and pressure as in the foregoing tests with honey.

TABLE VI. MIXTURE OF DEXTROSE AND LEVULOSE, DRYING IN GLASS TUBES ON ASBESTOS IN STEAM BATH AT ATMOSPHERIC PRESSURE AT 98° C. AND 70° C., RESPECTIVELY.

Dextrose, 5·0009 grams in 100 c.c.
Levulose, 5·0038 grams in 100 c.c.
10 c.c. used in each determination = 1·0005 grms.

AT 98° C.							AT 70° C.				
48 hrs.	60 hrs.	80 hrs.	98 hrs.	120 hrs.	132 hrs.	140 hrs.	8 hrs.	20 hrs.	25 hrs.	36 hrs.	42 hrs.
grms.	grms.	grms.	grms.	grms.	grms.	grms.	grms.	grms.	grms.	grms.	grms.
·909	·885	·864	·846	·827	·818	·815	1·276	·954	·951	·944	·943
·901	·877	·856	·837	·817	·810	·806	1·172	·957	·956	·948	·947

TABLE VII. LEVULOSE (KAHLBAUM), DRYING IN PLATINUM DISHES ON ASBESTOS, IN PARTIAL VACUUM AT 75° C. TO 80° C. AND AT 70° C.

Levulose, 4·465 grms. in 100 c.c.
10 c.c. used in each determination = 0·4465 grms.

	AT 75° C. TO 80° C.			AT 70° C.			
Shape of Dish	4 Hours	8 Hours	24 Hours	8 Hours	12 Hours	14 Hours	18 Hours
	grms.	grms.	grms.	grms.	grms.	grms.	grms.
F.B.	3·236	·437	·428	....	....	....	....
	3·153	·426	·426	... .	... .	....	.....
R.B.	3·205	·437	·424	·584	·440	·437	·434
	3·746	·438	·425	·479	·438	·435	·431
				·944	·443	·442	·439

TABLE VIII. LEVULOSE (DIABETIN, "SCHERING"), DRYING IN PLATINUM DISHES ON (*a*) SAND, AND (*b*) ASBESTOS, IN PARTIAL VACUUM AT 70° C. TO 75° C.

Levulose, 5·472 grms. in 100 c.c.
10 c.c. used in each determination = 0·5472 grms.

ABSORBENT MATERIAL	Shape of Dish	24 Hours	48 Hours
		Grams	Grams
Sand	F.B.	·5385	·5309
	R.B.	·5404	·5290
	R.B.	.5386	·5314
Average	....	·5392	·5304
Asbestos	F.B.	·5293	·5239
	R.B.	·5288	·5206
	R.B.	·5276	·5214
Average	....	·5286	·5219

TABLE IX. LEVULOSE (KAHLBAUM), DRYING IN PLATINUM DISHES ON (*a*) SAND, AND (*b*) ASBESTOS, IN PARTIAL VACUUM AT 60° C.

Levulose, 5·2228 grams in 100 c.c.
10 c.c. used in each determination = 0·52228 grams.

ABSORBENT MATERIAL	Shape of Dish	21 Hours	25 Hours	43 Hours	48 Hours
Sand	F.B.	·543	·525	·525	·525
	R.B.	·905	·528	·528	·528
Asbestos	F.B.	·539	·510	·510	·509
	R.B.	·534	·507	·506	·505

GENERAL DEDUCTIONS FROM DATA IN TABLES VI. TO IX.

The results given in Table VI. show a considerable loss due to decomposition on drying a mixture of dextrose and levulose on asbestos for 48 hours at 98° C.— and this loss constantly increased. At a temperature of 70° C. (atmospheric pressure), 8 hours drying was insufficient, but an additional period of 12 hours proved too long.

From Table VII. it is apparent that a temperature of 75° C. to 80° C.— using asbestos and drying in a partial vacuum — is too high. A drying period of 8 hours was sufficient to show that decomposition had commenced. Under the same conditions, but at 70° C. a period of 12 hours furnished results indicating a thorough desiccation of the levulose but no decomposition. Further drying, however, undoubtedly caused dehydration of the sugar.

In the results of Table VIII. the relative value of sand and asbestos as absorbent materials is compared at 70° C. to 75° C. As in the case of honey, we find that with asbestos there is a greater loss on drying than when sand is used. In 24 hours the loss through decomposition, using sand, is about 1·4 per cent, whereas with asbestos it is approximately 3·4 per cent. At 48 hours these losses, respectively, are practically 3·1 per cent and 4·6 per cent.

The data furnished in Table IX. are indicative that 25 hours drying in a partial vacuum at 60° C. on sand is sufficient for desiccation of the levulose, and that there is no decomposition or further loss on continued drying. In the case of asbestos, under the same conditions, there appears to be decomposition (between 2 per cent and 3 per cent) of the levulose. It is evident that even at this low drying temperature sand is the preferable absorbent.

The results of the work on levulose solutions agree very well on the whole with those obtained on solutions of honey. It has already been shown that drying the latter from 24 hours to 48 hours at 60° C. to 70° C., in a partial vacuum on sand, gave percentages in close accord with those obtained from the specific gravity determinations. The investigations with levulose solutions prove that a temperature of 60° C., in a partial vacuum using sand, furnished figures approximating the amounts weighed out. It is probable that a temperature of 70° C. could be safely used if the pressure were reduced to, say, 6 or 8 inches, but with the partial vacuum that we were able to maintain it is evident that the drying temperature should be as close as possible to 60° C.

IV.—*An Experimental Investigation of the Conditions Determining the Oxidation of Ferrous Chloride.*

By A. McGILL, B.A., B.Sc.

(Read May 27, 1902.)

The following sequence of reactions, having in view the production of free chlorine and carbonate of soda from common salt, by the agency of carbon and oxygen, is satisfactory so far as theory is concerned.

First Stage.—The decomposition of chloride of sodium by sulphuric acid, with production of sulphate of soda and hydrochloric acid.

Second Stage.—Treatment of the sulphate of soda with peroxide of iron and carbon, to produce carbonate of soda and sulphide of iron.

Third Stage.—Decomposition of the sulphide of iron by hydrochloric acid, with production of ferrous chloride and sulphuretted hydrogen.

Fourth Stage.—Oxidation of ferrous chloride, (by air or oxygen) to ferric oxide and free chlorine.

Fifth Stage.—Oxidation of sulphuretted hydrogen to sulphuric acid.

It will be seen that the complete process involves a continuous supply of common salt, carbon and oxygen, and furnishes a continuous output of carbon monoxide, carbonate of soda and free chlorine.

The sulphuric acid and ferric oxide introduced at the first and second stages, are reproduced in the fifth and fourth stages respectively; while the hydrochloric acid, sulphate of soda, sulphide of iron, chloride of iron and sulphuretted hydrogen only exist as phases within the cycle.

The following diagrammatic presentation of the cycle will make this more evident. In the diagram the materials *used* are heavily underlined; the substances *removed* from the cycle are enclosed in brackets; while the arrows connect the names of such substances as are present at different phases of the process, and undergo reciprocal change within it. Of these, sulphuric acid and ferric oxide, which are introduced at the beginning of the process, and reproduced at the end of it, are indicated by broken lines.

The reaction occurring in the first stage is successfully carried out in the ordinary manufacture of salt cake.

The second stage is the fundamental principle on which Kopp's soda process is based.[1] This process has been approved by Stromeyer[2] but condemned by Hoffman, Waldeck and Lunge. The main features objected to are the destructive action of the mixture of sulphate of soda, ferric oxide and coke upon ordinary furnace linings; and the impossibility of recovering a high percentage of the total soda, as carbonate. The first objection is met by Macfarlane[3] who describes a furnace lining of quicklime and basic slags, impregnated with sodium sulphide. The second disadvantage is avoided by another of Macfarlane's claims, according to which the carbonating is done by furnace gases during the lixiviation.

The third stage, involving the decomposition of ferrous sulphide by hydrochloric acid, with formation of ferrous chloride and sulphuretted hydrogen presents no difficulties.

The fifth stage, in which sulphuretted hydrogen is burned to furnish SO_2, for the leaden chambers in the manufacture of suplhuric acid, is equally free from practical difficulties.[4]

The object kept in view throughout these experiments, and that which furnished a motive for the work, was the demonstration of conditions necessary to make the reactions of the *fourth stage* practically successful.

Recorded attempts to produce chlorine by the oxidation of chloride of iron are the following:

Thibierge (Eng. pat. 2290, 1855) proposes to pass dry air over ferrous chloride; but I cannot find that the process has ever been investigated under the conditions of his patent. The same reaction is utilized by Macfarlane (1863) and by Longmaid, Königs, Henderson and others. In no case, however, does it appear that the process has been subjected to a full and searching investigation; and it was through Mr. Macfarlane that I was led to enter upon the work now put on record. I have had the advantage of consultation with Mr. Macfarlane throughout the progress of the investigation, and it is largely due to his encouragement and assistance that I have been able to carry it to a successful conclusion.

I may here draw attention to the fact that the patents of Swindells and Nicholson (Eng. pat. 390, 1852), and of Larkin and White (Eng. pat. 3093, 1870) treating of the production of chlorine by oxidation of chloride of iron, refer to the per-chloride, and are to be distinguished from those previously mentioned.

---

[1] Ann. Chim. Phys., Sept., 1856, p. 21; and Lunge, Sulphuric Acid and Alkali, 2nd Edition, III., 223.

[2] Ann. Chem. Pharm., CVII., p. 333.

[3] Engl. Patent 126, 1863.

[4] Lunge, Sulphuric Acid and Alkali, I., 277.

First Series.—On examining the work of this series in the light of later results, it is evident that the disappointing record shown is chiefly due to the small percentage of water still present in the samples of ferrous chloride used. I had taken, as I thought, all necessary precautions to have both the chloride and oxide thoroughly dry.

The influence of mere traces of water in the charge, is very perceptible in destroying available chlorine, and is expressed by the formula $\frac{71}{18} \times 100 \frac{x}{a} = \frac{394\,x}{a}$ per cent of chlorine in the sample, where:—

$a =$ per cent chlorine in sample.
$x =$ " water "

Hence, the loss of free chlorine for each unit per cent of water in Sample I. is 10·8 per cent, and in Sample III. is 20·2 per cent of the total chlorine in these samples, respectively.

The highest result in free chlorine obtained with Sample I. is 33·1 per cent (Expt. 16), and this is also the best yield of the series.

Taken in connection with other experiments in which Sample I. was used, it shows the favourable influence of a large proportion of ferric oxide, a condition fully confirmed by later results.

Especial pains were taken to dry Sample III., yet the best result obtained with it was 20 per cent available (Expt. 9), and this although in Expt. 12, as much as 91·6 per cent of its total chlorine passed over into the absorbers. The fact that for each 1 per cent of water present, 20·2 per cent of chlorine reverted, was not taken into consideration at the time, and, in consequence, the investigation was discontinued during an interval of nearly nine years.

Second Series.—The investigation was resumed in December, 1899, chiefly on account of the fact that, during the interval, methods for the production of oxygen (or highly enriched air) had been developed, and it was believed that oxygen could be economically employed for the oxidation of ferrous chloride. The samples used were dried with no greater care than those employed in the First Series, but Sample V. must have been very dry, since in several experiments it yielded about 60 per cent of its total chlorine in the free state. It is noteworthy that in one of these experiments (No. 15) air only was used; and the chief positive result of this series is to demonstrate that, so far as liberation of chlorine is concerned, oxygen has no important advantage over atmospheric air. Perhaps other considerations, such as the dilution of the product by atmospheric nitrogen, may be found to give cheap oxygen an advantage over air; but the examination of this point does not fall within the scope of the present investigation. (See Expt. 32, of Series III.)

Third Series.—This series was undertaken in order to ascertain whether it was practicable to make ferrous chloride sufficiently dry, by roasting on iron plates, to obtain from it a high yield of free chlorine. Roasting in air is attended by more or less oxidation and loss of chlorine; so that experimental proof was wanted of the possibility of making the charge absolutely dry, without too great waste of chlorine at the same time. Samples A and B, used in this series, are identical with V. and VI. of the Second Series. The remaining samples are mostly prepared from these two, by mixing with ferric oxide or ferric hydrate, and drying. It is unfortunate that a galvanized iron plate was used in drying samples A and B, hence introducing chloride of zinc into the charge. The influence of this impurity is slight in samples C, D, F and G.

The importance of thorough drying had been seen, and the yield of available chlorine is much better throughout the whole series. The catalytic influence of Fe_2O_3 is recognized, and the presence of a large excess of ferric oxide was found to be favourable to the preliminary drying of ferrous chloride. Samples F and G with which the work of this series was begun, contain about 65 per cent of ferric oxide; and sample CC, which gave encouraging results in experiments 12 to 26, contained about 10 per cent of ferric oxide, and gave decidedly higher results in free chlorine when ferric oxide was added to the charge — (Expt. 18, 22, 25, 26). The fact that Fe_2O_3 acts catalytically, and not merely mechanically is further borne out by the results of Experiments 21 and 24 in which dry gypsum and dry sand. respectively, were substituted for ferric oxide, with an immediate decrease in the percentage of available chlorine.

Experiment 23 is introduced for incidental investigation of the question of recovery of chlorine from Solvay process waste, by a variation of this mode of working. The question is important enough to justify separate treatment; and there can be no doubt that special apparatus must be devised to overcome the difficulties introduced by the extreme hygroscopicity of chloride of calcium.

The experiments made with sample EE (Nos. 28 to 33) prove the practicability of recovering the chlorine from Solvay waste by the use of ferrous sulphate. This sample contained about 15 per cent of calcium sulphate, yet gave a high yield of available chlorine.

The final results of this work may be summed up as follows:—

First.—That ferrous chloride can be decomposed by oxygen in such a way as to yield uniformly, from 75 to 85 per cent of its chlorine in available form, and from 10 to 20 per cent as hydrochloric acid.

Second.—That the oxygen in atmospheric air can be successfully employed, although it may be that an impracticably large dilution of the resulting chlorine with nitrogen would thereby result.[1]

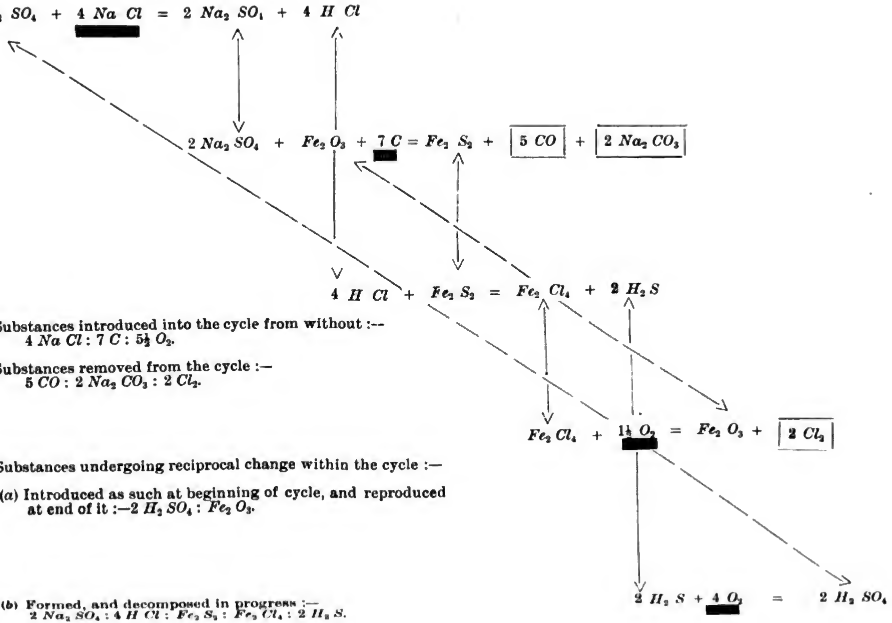
Third.— That very complete dehydration of the charge of ferrous chloride is necessary to a high result of free chlorine.

Fourth.—That both the drying of the charge, and the subsequent oxidation are aided by the presence of ferric oxide, which should form at least fifty per cent by weight of the charge.

Fifth.—That a red heat is necessary to bring about complete decomposition.

---

[1] From the equation $Fe_2Cl_4+3O=Fe_2O_3+2Cl_2$ the ratio of oxygen required to chlorine produced is, 1·3 by weight, or 3·4 by volume. Or each gramme of chlorine requires nearly 0·25 litre oxygen = 1·25 litres atmospheric air.



1. $2\ H_2\ SO_4 + \underline{4\ Na\ Cl} = 2\ Na_2\ SO_4 + 4\ H\ Cl$

2. $2\ Na_2\ SO_4 + Fe_2\ O_3 + \underline{7\ C} = Fe_2\ S_2 + \boxed{5\ CO} + \boxed{2\ Na_2\ CO_3}$

3. $4\ H\ Cl + Fe_2\ S_2 = Fe_2\ Cl_4 + 2\ H_2\ S$

(1) Substances introduced into the cycle from without :—
$4\ Na\ Cl : 7\ C : 5\frac{1}{2}\ O_2$.

(2) Substances removed from the cycle :—
$5\ CO : 2\ Na_2\ CO_3 : 2\ Cl_2$.

4. $Fe_2\ Cl_4 + \underline{1\frac{1}{2}\ O_2} = Fe_2\ O_3 + \boxed{2\ Cl_2}$

(3) Substances undergoing reciprocal change within the cycle :—

(*a*) Introduced as such at beginning of cycle, and reproduced at end of it :—$2\ H_2\ SO_4 : Fe_2\ O_3$.

5. $2\ H_2\ S + \underline{4\ O_2} = 2\ H_2\ SO_4$

(*b*) Formed, and decomposed in progress :—
$2\ Na_2\ SO_4 : 4\ H\ Cl : Fe_2\ S_2 : Fe_2\ Cl_4 : 2\ H_2\ S$.

DESCRIPTION OF THE SAMPLES OF FERROUS CHLORIDE USED IN THE EXPERIMENTS.

SAMPLE	Total Chlorine p.c.	Equivalent $Fe_2 Cl_4$.	Ferric Oxide. Approx.	REMARKS
I	36·51	65·3	30	Nearly 1% of the chlorine existed as $Fe_2 Cl_6$.
II	35·53	63·6	30	
III	19·50	34·9	60	Made from II by addition of $Fe_2 (OH)_6$ and roasting.
IV	46·98	84·1	25	
V	47·3	81·5	15	Contained 2·8% $Fe_2 Cl_6$. From iron and HCl.
VI	17·97	32·14	65	By addition of $Fe_2 O_3$ to V, moistening, mixing and drying on an iron plate.
A [1]	47·3	81·5	10	Prepared from iron (filings) and HCl. Same as V.
B [1]	17·97	32·14	65	Same as VI.
C [1]	49·24	87·9	10	Like A, but coarser granules.
D [1]	21·87	39·1	60	The fine siftings from C, mixed, dry, with $Fe_2 O_3$—.
E	41·5	74·1	20	Prepared from reaction of $Fe SO_4$ $Ca Cl_2$.
F [1]	19·23	34·3	65	From D, by mixing with water and redrying.
G [1]	19·56	34·9	65	Same as F, but is the fine dust sifted out.
H	7·46	13·3	85	From M by addition of $Fe_2 O_3$.
M	9·04	16·1	80	From $Fe SO_4$ and $Ca Cl_2$.
S				350 grms crystallized $Fe SO_4$, 7 $H_2 O$ dried to weigh 185 grms—contains 50·1% SO_3= 95·2% $Fe SO_4$.
W				Like S, but an old peroxidized sample copperas used; product contained 47·9% SO_3—.
X	62·3			A sample of $Ca Cl_2$ fused and powdered, chlorine corresponds to 97.4% $Ca Cl_2$. Reaction alkaline; probably about 2% $Ca O$—trace moisture.
CC [1]	50·9	90·9	10	Prepared from C by heating to loss of 11·2% of its weight. Loss chiefly $H_2 O$ (Expt. 7).
SX	25·8			A mixture of $Fe SO_4$ (S) and $Ca Cl_2$ (X) in ratio 100; 71, *i.e.*, in molecular proportions.
AA [1]	52·2	93·2	5	Prepared from A by heating to loss of 9·6% weight, contains $Zn Cl_2$ from drying on galv. iron plate.
EE	43·75	78·1	5	Prepared like E, this last being added to it and the whole carefully dried. It contains 14·8% $Ca SO_4$—(calculated from 8·72% SO_3 found).

---

[1] These samples, especially A and AA, contained a trace of $Zn Cl_2$ from having been roasted on a plate of galvanized iron.

Serial Numbe of the Experim		Remarks
1	ry air, till	
2	....	
3	ass rod as	
4	....	Tube cracked
5	....	
6	....	
7	. ...	
8	nsation of the cooler	
9	n of tube	
10	ss before	
11		
12		
13	......	
14	..	
15	....	
16	....	Excess of $Fe_2 O_3$ favourable
17	....	Tube cracked
18	.....	Tube cracked
19	. . ...	
20	are main-	Excess of Fe_2O_3 is favourable
21	kept hot.	
22	....	Strong heat requisite
23	5 minute	

---

[1] Fo

[2] In

V.—*Researches in Physical Chemistry, carried out in the University of Toronto during the Past Year.*

By PROFESSOR W. LASH MILLER.

(Read May 27, 1902.)

The eight papers whose titles follow have already appeared in the chemical journals or will shortly be published. Owing to the delay attending the publication of the Proceedings, it has not been thought advisable to ask the Society to print these papers in full.

(1) *The Application of Polarimetry to the Estimation of Tartaric Acid in Commercial Products:—Professor Edgar B. Kenrick (University of Manitoba) and Dr. Frank B. Kenrick.* The influence exerted by a large number of substances on the rotation of tartaric acid was studied, and methods were worked out for the analysis of the chief commercial products containing it. (Jour. Am. Chem. Soc. XXIV. 928.)

(2) *The Sulphates of Bismuth:—Dr. F. B. Allan.* An application of the phase rule. The following salts were identified:— $Bi_2O_3.4SO_3$, $Bi_2O_3.2SO_3.2\frac{1}{2}H_2O$, $Bi_2O_3.SO_3$. (Am. Chem. Jour., XXVII, 284.)

(3) *The Rate of Oxidation of Ferrous Salts by Chromic Acid:—Miss C. C. Benson.* The rate was determined as a function of the concentrations of the chromate, the acid, and the ferrous salt. Measurements of the rate of oxidation of ferrous salts, and of the rate at which iodine is liberated, in solutions containing chromic acid ferrous salts and iodides, are in progress.

(4) *The Reaction between Stannous Chloride and Water:—Mr. C. M. Carson.* The results are in conflict with those of Ditte.

(5) *The Rate of Oxidation of Ferrous Salts by Oxygen:—Mr. J. W. McBain.* Experiments carried out under the direction of Dr. F. B. Kenrick. The rates of oxidation of the sulphate, chloride, and acetate, were measured with various concentrations of the iron, the acid, and the oxygen. (Jour. Phys. Chem., V. 623.)

(6) *The Rate of Reaction in Solutions containing Potassium Chlorate, Potassium Iodide, and Hydrochloric Acid:— Mr. W. C. Bray.* Experiments showing that two reactions of the fourth order occur simultaneously. Schlundt's results are recalculated.

(7) *The Rate of the Reaction between Arsenious Acid and Iodine in Acid Solution; the Rate of the Reverse Reaction; and the Equilibrium between them:— Mr. J. R. Roebuck.* Experiments to test the theory of Kinetic Equilibrium. (Jour. Phys. Chem., VI., 365.)

(8) *The "Compensation Method" of Measuring the Rate of Oxidation of Iodides:—Mr. J. M. Bell.* The method was introduced by Harcourt, using sodium peroxide as oxidizing agent; it is not applicable when chloric acid, chromic acid, or ferric salts are employed. Schükarew's assumptions (Zeit. phys. Chem., XXXVIII. 357), are not justifiable.

VI.— *On the use of Wheatstone Stereoscope in Photographing Surveying.*

By E. DEVILLE.

(Read May 27, 1902.)

Dr. C. Pulfrich, of the Carl Zeiss Optical Works, in Jena, has devised an instrument, called stereo-comparator, for the purpose of making accurate measurements on stereoscopic views. The instrument, which is described in "Zeitschrift fur Instrumentenkunde," Nos. 3, 5, 6, and 8, of 1902, is constructed by the firm of Carl Zeiss; it is perfect in every detail and its results are remarkably accurate. Among other uses, Dr. Pulfrich describes its employment for photographic surveys. Taking two views of the ground from properly selected stations, the stereo-comparator gives, by means of a micrometer screw, the distance of any point of the landscape. The direction of the point is afterwards taken from the views by any of the well known methods and transferred to the plan upon which the point is then located by its distance. The altitude is deduced from the distance in the usual way. The instrument appears to be thoroughly practical and may prove of great value in surveying. A little difficulty may be experienced at first in securing proper stereoscopic views, but Dr. Pulfrich has already indicated the principle of a camera for that purpose and it may be hoped that the Carl Zeiss Works will soon place an efficient instrument at the disposal of topographers.

Another solution of the problem of stereoscopic surveying occurred to the writer, and experiments were commenced in 1896; owing to pressure of other duties, they had to be abandoned. In view of the attention now given to the subject, a description of the instrument devised at the time may offer some interest.

The apparatus is a Wheatstone or reflecting stereoscope provided with such adjustments as are necessary for plotting topographical plans. Let it be assumed that the two photographs of a pair are taken in the same vertical plane, that is to say, that the plates are vertical and the optical axis of the objective perpendicular to the line joining the two stations from which the exposures are made. The photographs may be taken with one camera carried from one station to the other, or, preferably, with two identical cameras operating simultaneously.

The instrument, fig. 1, consists of an eye piece or viewing stand, A, with two eye holes, DD, of two frames, BB, for the transparencies, and of a tracer, C, the whole being mounted upon a drawing table accurately plane.

The metal plate, DD, in which the eye holes are pierced revolves upon a horizontal axis perpendicular to the middle of the line joining the holes, the inclination of this line being indicated by a graduated arc and vernier E. The distance between the holes is equal to the

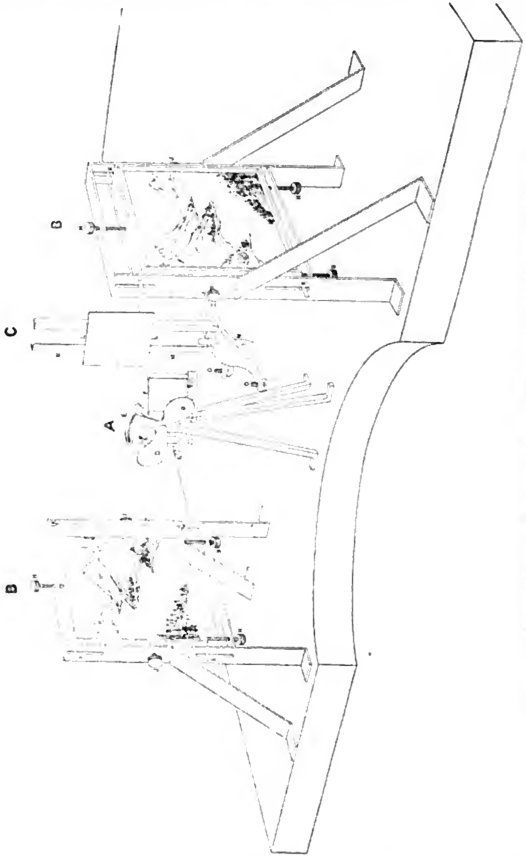


Fig. 1. Stereoscopic Apparatus for Plotting Topographic Plans.

interval of the eyes. This interval being variable with individuals, means must be provided to adjust the distance of the holes when the instrument is to be used by more than one person. The adjustment can be made by a simple arrangement, not shown on the figure. Behind the eye holes are two vertical glass plates with parallel faces, set at an angle of 45° with the axis. The front face is slightly silvered, but not enough to prevent seeing a bright point through the plates. Each one is provided with two adjusting screws like the small mirror of a sextant. One of the screws, G, revolves the glass around a vertical axis; the other screw, not visible on the figure, moves it around a horizontal axis parallel to the plate.

The transparency frames are upright and in the direction of the axis of the apparatus. They can be moved up and down by the screws H H H, or right and left by the screws J J. They are maintained in their planes by pins sliding in the slots K. For transparencies printed by contact, the distance from a frame to the image of the corresponding eye hole seen in the glass plate must be equal to the focal length of the objective used for taking the photographs. A better arrangement is to place the frames at the most convenient distance and to produce the transparencies by enlargement from the negatives in suitable proportion.

The base of the tracer C consists of three arms supported by foot screws O, the head of the screws being of spherical shape. The central arm carries a pencil N and two upright posts upon which slides a rectangular plate or screen L painted dead black. A small hole is pierced in the centre. The point of the pencil is in the plane of the face of the screen. The height of the screen is indicated by a scale M M upon one of the posts; when at zero of the scale, the hole of the screen is at the same height as the eye piece axis. The graduation extends on both sides of zero.

Before using the instrument for plotting, it is necessary to adjust the tracer and the reflecting glass plates.

For adjusting the tracer, move the screen to the top of the posts and mark the middle of its upper edge. The mark must not move when the tracer is revolved around the axis of the pencil, held stationary. If found to move and describe a circle, it is adjusted by means of the foot screws O O.

To adjust the glass plates of the viewing stand, set the line of the eye holes horizontal by placing the vernier at zero of the graduated arc, fix the tracer screen at zero of the altitude scale, draw on the table the trace Ot, fig. 2, of the vertical plane parallel to the axis and passing through one of the eye holes, the left one, for instance, place the point t of the pencil upon this trace and insert a plane mirror in the frame B. Should the instrument be properly adjusted, the hole of the screen and the image of the hole of the eye piece seen by reflection in the mirror will coincide when looked at through the eye hole.

The reflecting glass F gives a virtual image of the eye hole O in O_1; $F\,O_1 = F\,O$. The mirror B gives another virtual image of O_1 in O_2; $P\,O_2 = P\,O_1$. The reflecting glass F gives a third virtual image of O_2 in O_3; $F\,O_3 = F\,O_2$.

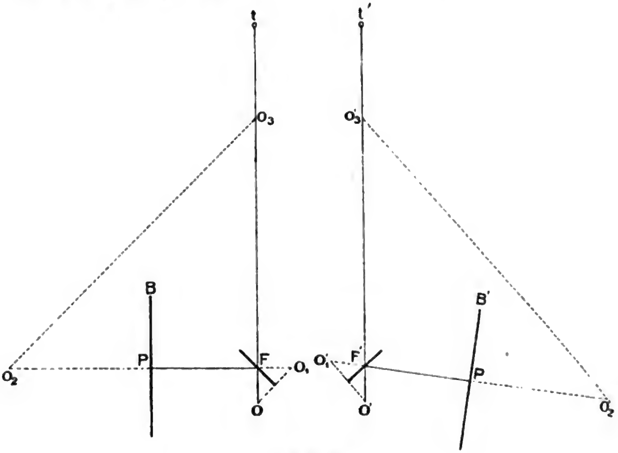


Fig. 2.

It is not necessary that the transparencies be vertical or parallel to the axis of the stereoscope or parallel to each other. The only condition to be fulfilled is that the visual ray parallel to the axis, that is to say the line passing through the principal point of the perspective, be reflected by the glass plate perpendicularly to the plane of the transparency. This line can be moved to any direction by means of the adjusting screws, therefore it can always be made perpendicular to the transparency. A frame may be placed at B′, which is parallel neither to B nor to the axis.

Should the two holes not coincide when seen through the eye hole, they are brought together by means of the adjusting screws of the glass plate F. The other glass plate is adjusted in the same manner. The instrument is now ready for plotting.

The first thing to be done is to mark the extremities of the horizon and of the principal lines upon the transparencies which are then inserted in their frames. The eye holes plate is set at an inclination equal to the slope of the line joining the stations from which the views were taken, which slope has to be measured on the ground either by direct angular measurement or by ascertaining the difference of altitude between the stations. The horizon and principal lines of each transparency must now be adjusted. Commencing, for instance, with the transparency on the left side which we may assume to have been taken from the highest station, the screen of the tracer is set at the height of the left eye hole; this is done by setting the screen at a height above zero equal to half the difference in altitude between the two stations (reduced to scale). The tracer is moved until seen through the eye hole it appears close to the edge of the frame; by means of the screws H H, the frame is displaced up or down until the hole of the screen is bisected by the end of the horizon line. The tracer is now moved until it is seen close to the opposite edge of the frame which is adjusted in the same manner. The same operation is repeated several times until both ends of the horizon line are in correct position.

To adjust the principal line, the trace of the vertical plane parallel to the axis and passing through the eye hole is drawn upon the table and the point of the tracer pencil is set upon this trace. The screen of the tracer is moved up or down until close to the upper or lower edge of the transparency frame and fixed in that position. The frame is now moved by means of the screws J J until the hole in the screen is bisected by the extremity of the principal line. Should the screen be moved until seen near the opposite edge of the frame, the hole must be bisected by the other extremity of the principal line, without further adjustment. Each transparency is, of course, adjusted in the same manner, and by a separate operation.

Looking now through the eye holes with both eyes, the hole in the screen appears as a bright point projected over the relief of the ground. Guiding the tracer by hand so that the point seems to follow and remain in contact with the surface of the ground, the pencil describes on the table a contour line. When the screen is at zero, the altitude of the contour is equal to the mean of the altitudes of the two stations. For describing any other contour line, the screen is displaced above or below zero a distance (reduced to scale) equal to the difference between the mean altitude of the stations and the altitude of the contour line to be drawn. Other lines not situated in horizontal planes, like the shore of a rapid river, a road or other features of the ground, are drawn by using a screen with a vertical slit instead of a hole. The tracer is moved so that the slit appears to pierce the ground along the line which is to be plotted.

For the sake of simplicity, it has been assumed that the two views of a stereoscopic pair were taken in a vertical plane parallel to the base line. This condition can be dispensed with and use made of views taken from the extremities of the base line S S′ (fig. 3) in the directions S X and S′ Y forming with the base angles α and β. The adjustments of the stereoscope are made as usual, but with this difference; instead of placing the tracer upon a parallel to the axis of the stereoscope passing through the eye hole, it is placed in t (fig. 4) upon a line Ot, forming with the axis an angle equal to $90° - \alpha$. With such views, the reflecting glass plates have to be adjusted for each pair of views; it would, therefore, be proper to substitute ordinary tangent screws for the adjusting screws. The adjustment of the reflecting glass plates is a quick, precise, and simple operation; its repetition for each pair of views is a small matter and cannot cause any inconvenience. The vertical axis around which each reflecting glass plate revolves must be so placed that the focal distance of the transparency does not change when the glass is revolved by the adjusting screw.

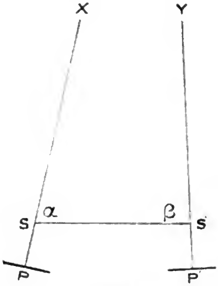


FIG. 3.

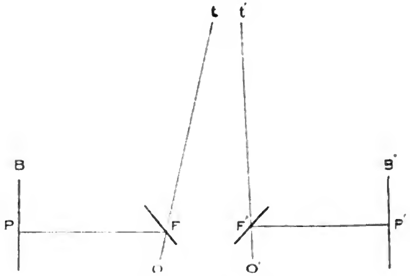


FIG. 4.

This property of the stereoscope permits the employment of views taken with cameras, such as the one used on Canadian surveys, which are not provided with telescopes for directing them accurately. There is little doubt that the difficulty of the stereoscopic method will be to obtain the pairs of views on the ground. The methods hitherto proposed require views taken perpendicularly to the base line; that seems simple enough, but when tried in the ordinary course of surveying operations, it may not be found so easy as it appears. It is an important advantage of the stereoscope that this condition has not to be fulfilled.

The scale of the plan is the proportion between the interval of the eye holes and the distance (not reduced to the horizon) between the two stations. Should, for instance, the holes be 65 millimetres apart, and the distance of the stations be 65 metres, the scale of the plan will be $^1/_{1000}$.

The direction of the meridian is deduced from the azimuth of the axis of the camera, represented upon the plan by a parallel to the axis of the stereoscope.

The plan is afterwards reduced or enlarged by photography to the scale of the general map. It will be observed that after the views are taken, the scale of the plan drawn by means of the stereoscope is invariable, depending only upon the distance of the stations; it is, therefore, essential to select this distance so as to obtain a suitable scale. The plan should not be so small that details would become indistinct, neither should it be so large as to extend beyond the range where the tracer can be handled conveniently. This limitation in the selection of stations is a disadvantage and the instrument is inferior in that respect to the stereo-comparator, with which the distance of the stations may vary to a considerable extent. It is true that other organs might be introduced in the stereoscope for changing the scale of the plan, but the instrument would become more complicated.

It must also be noted that the scale is the proportion between two distances. one of them being the interval of the eye holes which is liable to variations according as the eyes are opposite one part or another of the holes. Moreover, no magnifying power is available and there are other causes of error. So far as accuracy is concerned, the stereoscope is, therefore, far inferior to the stereo-comparator. On the other hand, the plotting is much less laborious and the instrument would seem to be particularly suitable for detailed reconnaissance surveys. It may be that unforeseen difficulties will be met with in practice; until the instrument has received the test of practical experience, it would be idle to speculate upon its value.

VII.—*Excited Radioactivity Produced from Atmospheric Air.*

By S. J. ALLAN, M.Sc.

Demonstrator in Physics, McGill University.

(Communicated by Prof. Rutherford, and read May 27, 1902.)

Elster and Geitel have shown,[1] that when a negatively charged body such as a wire, is exposed to the air for some time it becomes temporarily radioactive, that is, it has the power of discharging electricity from a charged body, and that this radioactivity decayed with time. They also showed that this radioactivity could be dissolved off by dilute acid and after being evaporated down to dryness, the residue was still radioactive.

The radioactivity in its properties is thus similar to that produced by the radioactive compounds, thorium and radium.

This paper gives a brief account of experiments made by the author during the past winter at McGill University. In most of the work hitherto done on this subject the experimenters have used the gold leaf electroscope method to observe the rate of leak of the charged body.

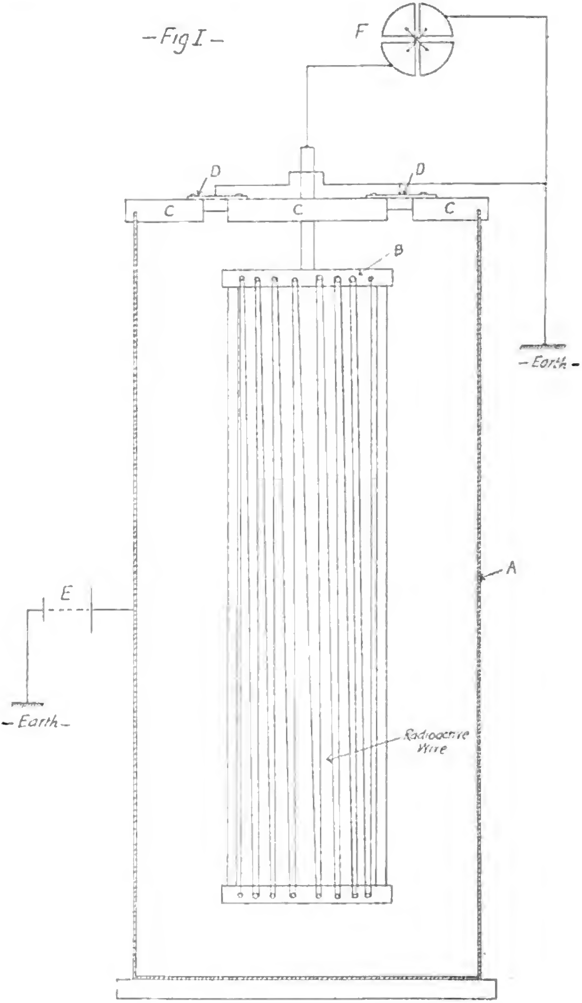
The author was fortunate enough to be able to make use of the very sensitive electrometer used by Prof. Rutherford in his work on radium and thorium. Whilst the method hitherto used has been slow and did not allow of sufficient readings being taken, the electrometer gave very rapid and accurate readings. Some of the experiments have already been described in a paper by Prof. Rutherford and the author.[2]

The method used was as follows:—The wire on which to collect the radioactivity was stretched between two insulated supports. The negative terminal of a Wimshurst machine was then attached to the wire, the positive terminal of the machine being earthed. The wire was thus kept at a certain potential above earth. To ensure the potential always being about the same during the run, an adjustable spark gap was introduced between the wire and earth. The distance between the knobs was arranged so that it would never quite spark across, thus ensuring the potential never rising above a certain value. The spark gap was calibrated and we could always tell approximately the voltage the wire was at. The Wimshurst machine was driven by an electric motor.

---

[1] **Phys. Zeit., 1901.**

[2] **Phys. Zeit., 1902.**


-Fig I-
F
D
D
C
C
C
B
-Earth-
A
E
-Earth-
Radioactive Wire

The apparatus used for testing radioactive wire in most of the experiments is shown in Fig. 1. It consists of a metal cylinder A closed at the bottom, this cylinder serving as the outer electrode. The inner electrode consists of an iron frame B of rectangular shape, 120 cms. long and 10 cms. wide. The radioactive wire was wound on this frame from end to end making about 15 turns of wire.

This frame was hung inside the cylinder by means of an insulated cross-bar C. This cross-bar was in three pieces, joined together by two pieces of brass D D. These brass strips were connected together and earthed. This arrangement acting as a guard ring and prevented any leakage at the ends. The outside cylinder was connected to one pole of battery E, the other pole of which was earthed.

The battery consisted of a group of storage cells from which any voltage from 2 up to 600 could be obtained. The diameter of cylinder was 30 cms. and the length 200 cms. The inner electrode was connected to one pair of quadrants of the electrometer F, the other pair being earthed.

The electrometer consisted of a very light needle of silvered paper suspended by a very delicate quartz fibre between upper and lower pairs of quadrants. The needle was charged up to a potential of 200 volts by lightly touching it with a fine wire at a potential of 200 volts. The charge on the needle kept quite constant, never leaking away more than 10 per cent in 24 hours, so that for readings over a few mins. it would be quite constant. To make sure whether the charge on the needle had leaked away much, an arrangement was used which consisted of two parallel plates of metal between which a standard specimen of uranium was placed. The lower plate was charged to 50 volts and the upper plate was connected temporarily to the electrometer. The rate of leak induced by the uranium being constant, the needle could thus always be standardized. The readings of the electrometer were thus always comparable. The movement of the needle was observed by means of a telescope and scale. When the needle was at a potential of 200 volts, one scale division corresponded to a P. D. of ·0018 volts, or a little over 500 scale divisions per volt. We could thus observe very small rates of leak something of the order of 10^{-11} amperes being the current generally produced. When not taking an observation the quadrants were all connected to earth. When a reading was to be taken, one pair of quadrants was separated from earth by means of a key operated from a distance by a string. The time taken for the needle to move over a certain number of scale divisions was observed by means of a stop-watch. This gave a measure of the ionization current between the electrodes.

Very often the movement of the needle was too rapid to observe by means of the eye, so that when this was the case, a condenser was connected in parallel with the electrometer cutting down the current to any desired ratio. Several readings were always taken at a time and they were always quite consistent. The electrometer and all connecting wires were surrounded by metal screens connected to earth, preventing any stray electrical effects from reaching the electrometer. All the woodwork, etc., in the neighbourhood of the electrometer was covered with metal and earthed.

Decay of Radioactivity.

Many experiments were made to determine the rate of decay of excited radioactivity. The charged wire was supended in different places, such as in closed rooms and in the air outside the building.

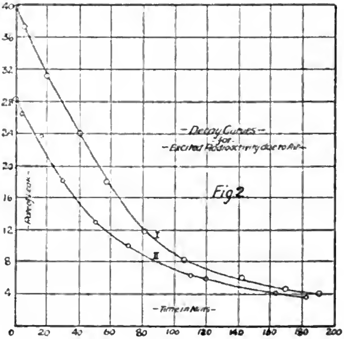


Fig. 2 shows two such curves plotted. I. A copper wire charged for 210 mins. at a P. D. of —25,000 volts inside the closed room. II. A copper wire charged for 270 mins. at a P. D. of —24,000 volts, outside in the open air. An examination of these curves shows that they fall to one-half their value in about 50 mins., following very closely a geometrical progression, as can be seen by the following results:

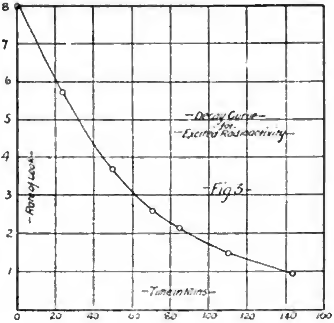
CURVE I.

Falls to ½ value in about 52 mins.
" ¼ " " 96 "
" ⅛ " " 176 "

CURVE II.

Falls to ½ value in about 48 mins.
" ¼ " " 97 "
" ⅛ " " 188 "

Fig. 3 shows the results for a lead wire charged for 190 mins. at a P. D. of about — 25,000 volts. This falls to one-half its value in about 46 mins.



These experiments were performed at long intervals between and under different conditions. They show that the rate of decay is the same wherever the radioactivity is produced.

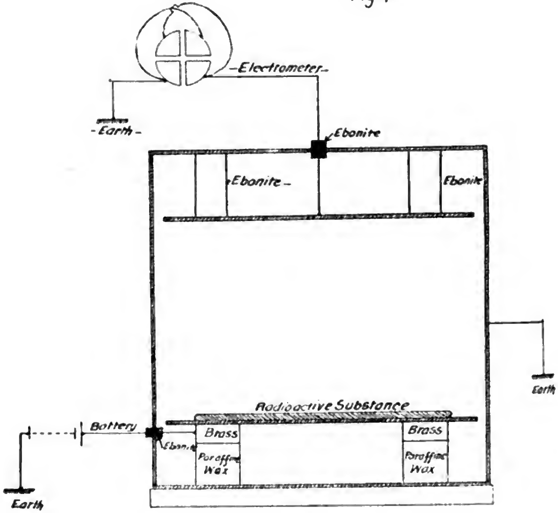
ABSORPTION OF RADIOACTIVITY.

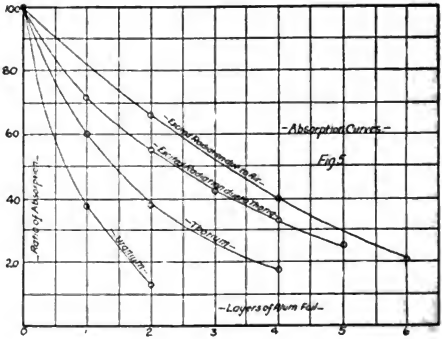
Several experiments were made to test the absorption of the excited radioactivity. For this purpose another apparatus was used. This is shown in Fig. 4. It consists of an upper plate A connected to the electrometer, a lower plate B connected to the battery C. The lead wire on which the radioactivity was collected was wound in the form of a flat spiral and placed on the lower plate. The whole was inclosed in a metal box connected to earth. The rate of leak was observed when the wire was bare, and when covered with various thicknesses of aluminum foil. From these two readings the amount of absorption could be obtained. The results are shown plotted in a curve, Fig. 5, along with some absorption curves for other radiations. It is seen that the excited radioactivity from air is of a more penetrating character than any of those types shown.

EFFECT OF WEATHER CONDITIONS.

A long series of experiments were made to determine the amount of radioactivity that could be collected on a wire under different weather conditions, especially those of a Canadian winter. For this purpose the wire was suspended outside in the open air, and was

-Fig 4-


-Electrometer-
-Earth-
Ebonite
Ebonite-
Ebonite
Earth
Radioactive Substance
Battery
Brass
Brass
Ebonite
Paraffin Wax
Paraffin Wax
Earth


-Absorption Curves-
Fig.5
-Excited Radioactivity due to Air-
-Excited Radioactivity due to Thorium-
-Thorium-
-Uranium-
-Ratio of Absorption-
-Layers of Alum Foil-
100
80
60
40
20
0
1
2
3
4
5
6

charged for a fixed time and voltage. The experiments extended over a good many days and under various sorts of weather. Some of the results are shown in the following table:

A copper wire charged for 30 mins. at a P. D. of —22,000 volts.

DATE	RATE OF LEAK DIVS. PER SEC.	CONDITION OF THE WEATHER.
Jan. 17th	23·0	Clear and cold, moderate wind.
" 20th	12·3	Clear and fairly cold, light wind.
" 23rd	46·5	Clear and fairly cold, very high wind.
" 24th	36·5	Clear and cold, high wind.
" 28th	28·0	Clear and very cold, high wind.
" 29th	22·5	Clear and cold, moderate wind.
" 30th	23·5	Clear and cold, light wind.
" 31st	5·3	Clear and cold, no wind.
Feb. 4th	12·0	Clear and cold, light wind.
" 6th	17·5	Clear and moderately cold, light wind.
" 7th	1·5	Dull and fairly warm, no wind.
" 8th	17·5	Dull, snowing, and high wind.

As can be seen by this table, the amount of radioactivity varied greatly on different days, on some being hardly observable, and on others enough could be collected in a few minutes to necessitate the use of a condenser in parallel to cut down the rate of leak.

A clear, windy, dry day seemed to give the best results, whilst a dull, quiet day the least. Experiments made since, during the spring weather, seem to show that on no day could there be obtained as much as in winter. The amount that could be obtained from the air inside never seemed to change very much. Two wires were charged for the same time and at the same potential, one outside the building and the other inside. Whilst that outside varied from time to time, that inside kept fairly constant.

VARIOUS EXPERIMENTS.

Experiments were made on the effect of length of charge. It was found that the amount of radioactivity increased directly with time for the first two hours and then more slowly. The amount of radioactivity was found to vary directly as the length of exposed wire and to be not effected by the diameter of wire nor the material of the wire.

To obtain a fair amount of radioactivity a large volume of air is necessary. From a closed box of about 1,000 litres no appreciable amount could be obtained. Several times the wire was charged positively, but not the slightest effect could be obtained. Experiments were tried to see the effect of voltage on the amount that could be collected. Owing to the difficulty of getting satisfactory conditions no definite relation could be obtained. At —4,000 volts the rate of leak after charging a certain time was 19 divs. per sec., whilst at —28,000 volts the rate of leak was 67 divs. per sec. for the same time of charge.

CONCLUSIONS.

From these experiments we may draw the following conclusions: The excited radioactivity from air is similar in its properties to that produced by thorium and radium, but is of a more penetrating character than either, and decays much more rapidly than that of thorium. It does not seem likely that it is caused by an emanation from the soil or vegetation, because it is more abundant in winter when the ground is covered with snow. The fact that we can obtain more when it is very windy is probably due to the fact that fresh carriers are continually being brought into the wire.

It is probably due to an emanation of positive electrons in the air, ever present though in varying quantities. This emanation in the ordinary state shows no tendency to collect on substances except when there is an electric field to draw them into the negative by charged wire. For a given volume of inclosed air there should be a saturation voltage at which all the carriers would be brought in. Experiments are at present being done on this point. In conclusion, I wish to express my gratitude to Prof. Rutherford for suggesting this subject, and to his kindly supervision of the work.

VIII.—*The Existence of Bodies smaller than Atoms.*

By E. RUTHERFORD, M.A., D.Sc
Macdonald Professor of Physics, McGill University, Montreal.

(Read May 27, 1902.)

During the last few years considerable evidence has been obtained of the production, under various conditions, of bodies which behave as if their mass was only a small fraction of the mass of the chemical atom of hydrogen. As far as we know at present, these minute particles are always associated with a negative electric charge. For this reason they have been termed "electrons." In whatever way they are produced, they always have the same charge and this charge is probably the same as that carried by the hydrogen ion in the electrolysis of water.

A brief historical account will be given of the growth of our knowledge of this subject, which seems likely in the near future to profoundly modify our ideas of the constitution of matter.

Faraday showed that when a current passed through a conducting solution, the amount of matter deposited or given off at the electrodes depended only on the quantity of electricity which had passed through the solution. For different solutions, the amounts of matter deposited for unit quantity of electricity are chemically equivalent to each other. It is now generally accepted that the current is carried through the solution by means of charged carriers or ions. In an electric field the negative ions travel through the solution to the positive electrode, and the positive ions to the negative.

The weight W of hydrogen given off for a passage of Q coulombs of electricity is given by

$W = z\,Q.$ where $z = 10^{-4}$ is the weight of hydrogen given off for a passage of one electromagnetic unit of electricity.

Let e = charge on an ion.
m = mass of each ion.
n = number of ions of hydrogen in a weight W.
Then $W = m\,n.$
$Q = n\,e.$

We therefore have $\dfrac{e}{m} = \dfrac{Q}{W} = \dfrac{1}{Z} = 10^4$

---

[1] The abstract of an address before Section III. of the Society, introducing a discussion on the evidence of existence of bodies smaller than atoms.

Experiments illustrating points of the theory were kindly shown to the meeting by Dr. J. Maclennan, of Toronto University.

This gives the ratio of the charge of an ion to its mass in the electro-magnetic system of units.

So far no assumptions have been made as to the actual value of the charge of the mass of an ion. Rough approximations to the values of these quantities can be obtained from considerations based on the kinetic theory of gases, but, as will be seen later, the evidence does not rest on the actual values of the mass but only on the value of the ratio $\frac{e}{m}$.

Sir William Crookes first drew attention to a remarkable phenomenon which showed itself when an electric discharge was passed through a highly exhausted vacuum tube. Below a certain pressure of the gas in the tube, a peculiar kind of rays are shot off from the cathode. These "cathode" rays travel in straight lines and produce brilliant phosphorescent effects on the walls of the tube and also on many other substances placed directly in their path. Crookes showed the path of the rays could be bent by a magnet. In a strong magnetic field these rays can be made to trace out spirals round the direction of the lines of magnetic force. He showed that they produced strong heating effects by their impact and a considerable mechanical pressure on vanes placed in their path.

For a long time two rival theories held the ground as to the explanation of these effects. The German school of physicists took the view that the cathode rays were ether waves of some kind. The English view, as voiced by Crookes, held that they were in reality projected particles travelling with high velocity. On the latter view most of the effects observed by Crookes received a simple explanation. The phosphorescent, heating, and mechanical effects were due to the bombardment of material particles, driven off from the cathode by a strong electric field. The curvature of the path of the rays by a magnetic field was due to the fact that a moving charge acts like a current.

The presence of two rival theories led to a large amount of investigation of the discharge in vacuum tubes.

Hertz tried if the rays were deviated by a strong electric field but failed to get any effect. Lenard, in 1895, showed that the cathode rays were able to pass through thin windows of glass, mica, or metal foil. He was thus able to examine the cathode rays outside the vacuum tube. He showed that the absorption of the rays by matter was independent of its chemical constitution and depended only on its density. This was true whether the matter was in the state of solid, liquid or gas. The fact that these rays could pass through solid matter, together with the absorption results, pointed to the conclusion that, if the rays were projected material particles, they must be so small that they were able to pass through the interstices of matter, or in other words, that to these particles matter behaved like a coarse sieve.

In 1895 Perrin showed that the rays carried with them a negative charge. This was strong evidence in support of Crookes' hypothesis.

The discovery of Röntgen rays gave a great stimulus to the investigation of the discharge in vacuum tubes. It was found that Röntgen rays were able to produce charged carriers or ions from the gas, through which they passed, and this made it probable that carriers of a similar kind existed in a vacuum tube.

The experiments of J. J. Thomson threw a great deal of additional light on the nature of the cathode rays and laid the foundation of all future work on that subject. He found that the rays were negatively charged particles travelling with enormous velocities and were probably of dimensions small compared with a molecule.

These results were deduced from experiment in the following way:

Let e = charge on the cathode ray particle,
m = mass of the particle,
v = velocity of the particle,
n = number of particles in a single discharge.

The mechanical energy of a single particle is $\frac{1}{2}$ m v^2 and this is mainly transformed into heat in the impact on a metal surface. The energy W in a single discharge was measured by observing the rise of temperature when the rays fell on a specially constructed thermopile. We therefore have $W = \frac{1}{2} m n v^2$. The amount of electricity Q carried by a single discharge was measured by an electrometer and was given by $Q = n e$.

Dividing the second equation by the first, we obtain

$$\frac{e}{m} = \frac{Q V^2}{2 W}$$

Another relation was obtained between e, m, and v by observing the curvature ρ of the path of the rays when a uniform magnetic field H was applied perpendicular to the direction of the rays. A charge e, moving with a velocity v, acts as a current of strength e v. The force exerted on the particle by the magnetic field is H e v and is mutually perpendicular to the direction of the field and the rays. The rays are made to trace out a curved path under the action of this force. The force which causes the body to move in a path of curvature ρ is dynamically given by $\frac{m v^2}{\rho}$ and this is equal to the applied force H e v.

$$\text{Therefore } H e v = \frac{m v^2}{\rho} \quad \text{or} \quad \frac{e}{m} = \frac{V}{H \rho}$$

$$\text{We have already shown that } \frac{e}{m} = \frac{Q V^2}{2 W}$$

$$\text{From these two equations we obtain } v = \frac{2 W}{\rho H Q}$$

$$\text{and } \frac{e}{m} = \frac{2 W}{\rho^2 H^2 Q}$$

Substituting the numerical values of H, E, and Q, it was found that in round numbers

$$\frac{e}{m} = 10^7$$

$$\text{and} \qquad v = 10^{10} \text{ cms. per sec.}$$

We thus have obtained the result that the value of $\frac{e}{m}$ for the particles is about 1,000 times as great as the same ratio observed for hydrogen on the electrolysis of water. If the charges are the same for both cases, the mass of the carriers in the cathode rays is only about 1-1000 of the mass of the hydrogen atom. The velocity of these particles is very great, approximating to the velocity of light, and enormously greater than any velocity of matter before observed in physics.

The theory from which these results are deduced is possibly open to some objections, but the values were confirmed by another independent method.

If the rays are charged particles their path should be altered in passing through an electrostatic field. Hertz obtained negative results; but J. J. Thomson, by varying the experimental conditions, was able to show that the rays are deviated and that the failure of Hertz to observe the effect was due to the masking action of the conducting gas, through which the particles moved. This electrostatic deviation supplied him with a simple means of determining the velocity and ratio of $\frac{e}{m}$ of the particles. The rays were made to pass between the plates of a charged condenser and were at the same time acted on by a magnetic field. The strength and direction of the field was so adjusted that there was no deviation of the path of the rays.

From the data of the experiment the values of the velocity and $\frac{e}{m}$ were found to be about the same as those determined by the first method.

J. J. Thomson also found that the ratio $\frac{e}{m}$ was independent of the gas in the vacuum tube, showing that, possibly, particles of the same size were produced from different kinds of matter. It is, however, possible to explain this result by supposing that the discharge is in all cases carried by the trace of water vapour which is always present in the vacuum tube.

A complete confirmation had thus been given to the projection theory of cathode rays, and the importance of the work was at once recognized by Continental physicists.

A series of experiments were performed by Des Coudres, Lenard Kauffmann and others, which verified and extended Thomson's results.

There was always present, however, a doubt that possibly the theory from which the results were deduced might be inapplicable, and that the enormous velocity of the particles did not exist in fact.

This last doubt was completely removed by Weichert, who showed, by actually measuring the time taken by the rays to pass from one point to another, that the velocity was of the same order as that obtained by previous observers by the methods already explained. Townsend showed by considerations based on the Kinetic theory that the charge on a gaseous ion was the same as on an ion in electrolysis. By a beautiful method, J. J. Thomson succeeded in determining the actual value of the charge, and this charge was found to be the same from whatever gas the ion is produced.

J. J. Thomson also made determinations of the ratio $\frac{e}{m}$ for electrons produced in two other distinct ways. Since the work of Hertz on electrical waves, it has been known that a clean surface of metal discharges negative electricity when ultra violet light falls upon it. The ultra violet light, in some way, produces negatively charged ions at the surface of the metal plate. At atmospheric pressure these ions are equal in size to the ions produced out of the gas by Röntgen or Becquerel rays, but at low pressures they have been shown to be similar to cathode rays. By observing the deviation of these ions by a magnetic field when they were made to move rapidly in a strong electric field, J. J. Thomson showed that the ratio of $\frac{e}{m}$ for the carriers was the same as for the cathode ray produced in a vacuum tube.

In a similar way he showed that the same ratio was obtained for negative particles shot off from the glowing carbon filament of an incandescent lamp.

We thus see that "electrons" produced under widely different conditions are all of the same size and of mass about 1-1000 of the hydrogen atom.

We have so far considered electrons which have been produced by the agency of light, heat, and the electric discharge, but there is also very strong evidence that these electrons are always present in matter and may manifest their presence under special conditions.

Zeeman discovered in 1896 that the bright lines in the spectra of many substances were displaced by a strong magnetic field acting on the source of light.

Later experiments showed that under certain conditions one of the D-lines of sodium, for example, was transformed into a triplet by the action of a magnetic field. These lines showed definite peculiarities in regard to the polarization of the light. These results were in direct confirmation of a theory advanced by Lorentz which considered light to be due to the rotation or oscillations of the electrons in the molecule. The equations representing the change of period of the light in a magnetic field involved the ratio $\frac{e}{m}$. From the change in wave length of the light vibration it was possible to deduce the value of this ratio. The value of $\frac{e}{m}$ was again found to be about 10^7, showing that in all probability that light was due to the rotation or oscillation of electrons in a molecule, and that the mass of the electron was much smaller than the atom itself.

Not only are these electrons present in matter, but in some cases they are spontaneously emitted from it. Becquerel has shown that the radioactive substances uranium and radium give out some rays deviable in a magnetic field. The writer has recently found that thorium, the other permanent radioactive substance, also possesses the same property. These rays were found to be analogous in all respects to high velocity cathode rays. They were deviated by a magnetic and by an electric field and carried with them a negative charge. Becquerel also showed that the particles travelled with a velocity not very different from the velocity of light, while the ratio of $\frac{e}{m}$ was again about 10^7.

Many of the electrons shot off from radioactive substances have a much higher velocity than the cathode rays in a vacuum tube. The highest velocity observed for the latter is about one-third of the velocity of light, while Kauffmann recently found that the velocity of some of the radium electrons was about 95 per cent of the velocity of light.

Experiments of these very high speed carriers are of great importance at the present time, in order to throw some light on the question as to whether the mass of the electron is apparent or real. On the present electro-magnetic theory a rapidly moving charged body increases in apparent mass with increase in velocity. When the carriers travel with the velocity of light the apparent mass would be infinite.

It is not yet settled what proportion of the apparent mass is electrical. It may possibly prove that the mass is altogether electrical in origin. If such should prove to be the case[1] (and it does not seem improbable), it would be very strong evidence in support of the view that all mass is electrical in character.

It thus appears that electrons produced by the electric discharge, by a glowing carbon filament, and by ultra violet light, as well as those present in incandescent sodium vapour or spontaneously emitted by radioactive substances, all alike show about the same ratio of $\frac{e}{m}$. Since the charges are the same in each case, the masses must be the same for the electrons produced in such widely different ways. The electron thus appears to be the smallest definite unit of mass with which we are acquainted. The view has been put forward that all matter is composed of electrons. On such a view an atom of hydrogen for example is a very complicated structure consisting possibly of a thousand or more electrons. The various elements differ from one another in the number and arrangement of electrons, which compose the atom.

We thus have a kind of modified Prout's hypothesis in which the electron is the ultimate corpuscle of which all matter is composed.

The physical existence of electrons is now accepted by many scientific men and there are a large number of prominent physicists who are developing mathematically the logical sequence of the idea. I need only mention a few of the more prominent workers—Drude, Voigt, Riecke in Germany, Lorentz and Zeeman in Holland, Poincaré and Becquerel in France, J. J. Thomson, Schuster, Lodge and Lord Kelvin in England, to show that the view has a solid basis of support among the ablest physicists.

---

[1] Within the last month, important results bearing on this point have been published by Kaufmann and Abrahams. The former has shown that the apparent mass of the electron *increases* with the speed in the same way as the electromagnetic theory suggests. He has deduced that the apparent diameter of the electron is 10^{-13} cms, and that its mass is probably altogether electromagnetic in origin.

The view that the atom is a complex aggregate instead of a simple entity, as was first supposed, does not in any way invalidate the basis of chemical theory. All we have to suppose is that the chemical atom is the smallest quantity of matter which takes part in a chemical combination, and that the removal of an electron is a sub-atomic change quite distinct from ordinary chemical action, although a chemical action may in some cases be accompanied by the emission of electrons.

The evidence of the complexity of the atoms of the elements is very strong from other points of view than those considered in this paper. The extraordinary complicated spectrum of heavy elements of atomic weights is of itself very strong support of the view that an atom is a very complicated structure.

At the close of the address there was a vigorous discussion among the members of the section, in which Professor Lash Miller, Cox, Goodwin, Baker, Walker and Ruttan took part.

IX.—*On an Improved Method of Producing Concentrated Manure from Human Refuse.*

By THOMAS MACFARLANE.

(Read May 27, 1902.)

For many years moss litter has been in use for bedding horses and cattle in Germany, England and the United States, and twenty years ago, the first mention of its applicability as a deodorizer and absorbent for human excreta was made by Dr. Ludwig Happe, in Braunschweig. Since then, its application for this purpose has been on the increase in Europe, and even half dried moss has been found useful at Caledonia Springs, in Canada. This, of course, at once recalls the dry earth system, in connection with which great improvements in sanitary arrangements were at one time expected. The advantages of dry moss over dry earth for the purposes referred to are, however, very decided. They consist in the perfect inoffensiveness of the moss manure, in the fact that one part of moss will dry and deodorize six parts of mixed excreta and in the greater agricultural value of the resulting manure.

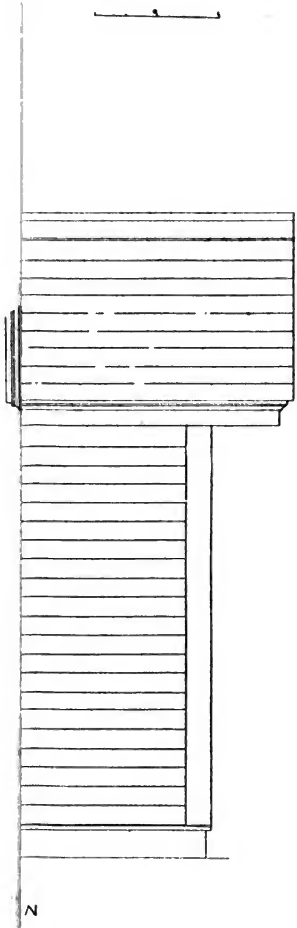
Although this country possesses in its numerous bogs and swamps an inexhaustible supply of this absorbent, still its use for disinfecting purposes is trifling. This is, perhaps, owing to a fear that the quantity required would be too great and the quality of manure produced too low in fertilizing constituents. In order to produce, with a minimum quantity of moss, the best quality of manure, the author undertook to conduct certain experiments in a closet of peculiar construction, which have been so successful as to entitle them to be minutely described.

The closet is constructed either in a separate house, in the manner shown in the drawing hereto appended, or in any outhouse attached to a dwelling, or in any apartment of the same. It is quite possible to place the closet or cabinet in the latter places, because, although used for the purposes of a privy, no disagreeable odours are produced from the excreta received and treated in it. In the drawing, the letter *A* indicates the seat occupied by the person using the moss closet, which consists of a movable lid with an opening in it, hinged at the back, so that it can be lifted up, completely exposing the receptacle for the excreta, marked *C*. Behind the latter, on the other side of a dividing partition, and marked F^1 and F^2, are shown boxes or hoppers, which are filled with the moss, turf powder, or peat dust, and which communicates with the excreta receptacle by the slit or opening *B*. The bottom of the hopper and of the receptacle is inclined at an angle of from 33 to 45 degrees towards the front of the closet, so that the dry moss or other absorbent may slide down as used towards the opening at the bottom of the receptacle. Of course, it is quite possible to construct a mechanical arrangement at the opening *B*, connected with an additional cover or lid, which, on closing the latter, would cause a sufficient quantity of absorbent to be thrown down into the receptacle. At the lowest place in the latter there is an opening through which the moss and excreta descend to the space *D*. *E* indicates the floor upon which the contents of the receptacle collect, and may be mixed and spread out. At *G* is shown a box for containing the moss litter or dry moss for use in covering the excrement. Instead of using the floor, a shallow box may be substituted, lined with thin sheet iron, but this has not been found to be indispensable.

The manner in which the closet is operated is as follows:—The moss litter, turf powder, peat dust or other absorbent, or the moss manure hereinafter to be described, is introduced into the hopper, F^1, and, by means of a small hook or hoe, or stick, is drawn or pushed down through the hopper, F^2, and opening, *B*, until sufficient has been introduced to cover the bottom of the receptacle. This done, the closet is ready to be used. After completing the evacuations, the person using it draws a sufficient quantity of the moss or absorbent from the back part of the receptacle by means of the small hoe and covers the solid excrement with it, or he may obtain the dry moss from the box, *G*. This completely prevents the escape of disagreeable odour, and the closet may be thus used without annoyance until the receptacle and the space beneath it are nearly filled. The urine is readily absorbed by the moss, provided the latter is not too dry. When the excreta and absorbent have accumulated in the receptacle and space *G* to an inconvenient extent, they are thoroughly mixed, by means of a long-handled shovel and spread over the floor, *E*.

The mixture thus spread is occasionally turned over, which may be done without the slightest annoyance, by any servant or municipal labourer, on the other side of the dividing partition from the closet, without interfering with its use. The manure spread over the floor loses moisture and dries sufficiently to be fitted for use in the closet again. It is then shovelled into the hopper, F^1, and takes the place of fresh moss or other absorbent. It is still capable of taking up the disagreeable emanations from solid excrement and urine, and may thus be used over again an indefinite number of times until, indeed, it has become too wet for rapid drying. It may then be removed to a special drying floor, allowed to lose more moisture, and may be

OSET



profitably sold as moss manure. By the above described method of manipulation this manure acquires a much higher fertilizing power than is possessed by night soil or barn-yard manure, and, being absolutely inoffensive, can be packed in bags or barrels and transported to great distances.

The drawing shows the arrangement above described as a double closet for use outside of any dwelling by both male and female inmates. Of course, it may be constructed singly, or placed in an outhouse, shed or cellar, in such a manner as may be found most convenient. The arrangement can also take the form of a cabinet and be placed in any inner apartment of a dwelling, and moved from one apartment to another. When used in places where it is exposed to great cold there is danger that the contents of the receptacle may freeze, but this may be prevented by the introduction of the moss in a proper manner. As a rule, it is best to begin using the dry moss late in the fall, in which case it resists freezing until the spring. When properly attended to there is no necessity for removing the manure oftener than once a year. The best time for removal is late in the fall, when it can be taken to a special floor for further treatment, or stored anywhere until spring.

When the moss or other absorbent is used repeatedly and for a long time, there is danger of a slight escape of ammonia during the time when the manure is exposed to the drying process. This may be prevented by previously mixing with the absorbent a small proportion of such chemicals as are capable of fixing the ammonia. For this reason I prefer to prepare an absorbent made up of the following quantities:—Moss litter, turf powder, or peat dust, 100 lbs.; ground gypsum or land plaster, 20 lbs.; copperas, 2 lbs. German authorities recommend an addition to the dry moss of two or five per cent oil of vitriol in a diluted state, which not only causes the ammonia to be retained, but occasions the destruction of all germs of infectious diseases. Possibly for both purposes an admixture of, say, 10 per cent superphosphate of lime would be effective, while at the same time an unusually valuable fertilizer would be produced.

As has been stated, the use of moss litter or peat dust for deodorizing purposes has much increased of late, especially in Germany, but so far as I am aware, the mixture has always been collected in a movable tub or pail or other receiver placed under the seat, and not in a receptacle such as above described. The necessity of frequently removing such receivers and their contents is always a cause of much expense, and does not always secure cleanliness. Besides, no opportunity is afforded under that system of properly saturating the dry moss used, or effecting a drying of the manure, nor has it ever been possible to produce direct in any closet an inoffensive artificial manure containing fertilizing constituents of a very high value. Furthermore in carrying out the peat dust or "torfstreu" system in Germany, the weight of absorbent used sometimes equals that of the refuse with which it is mixed, and it is never less than 1 lb. of absorbent to 5 lbs. of mixed excreta. By the system which I have practised of using the moss manure over and over again until saturated, the quantity of absorbent used forms only a small part, not more than one-twentieth of the resulting manure.

I may now make mention of the actual results of operating the closet in the manner above described, on my own premises in Ottawa. The closet was erected last fall, and has since been in continuous use by myself and other persons. 10 lbs. of dry moss from the Welland marsh were placed in its hoppers on the 11th November, 1900, and the mixing, spreading and re-using continued until the 8th May, 1901, when the product was carefully mixed and sampled. It was found to contain: —

	Per cent.	Lbs. fertilizing constituents in 2000 lbs.	Value 2000 lbs.
Moisture	60·60		
Organic substances	32·16		
Containing 1·75 total Nitrogen		35 at 13c.	$4.55
Ash	7·24		
Containing 0·71 of Phosphoric Acid		14·2 at 5c.	0.71
" 0·20 of Potash		4 at 5¼c.	0.21
	100·00		$5.47

This product has a value of $5.47 per 2,000 lbs., calculating the fertilizing constituents at the same prices per lb. as in agricultural fertilizers. This is a very encouraging result, for fresh barn-yard manure usually contains about 67 per cent of water and has a value of only $2.25 per ton of 2,000 lbs. Moss manure, as produced in Germany, with 83 per cent water, is worth $2.37 per 2,000 lbs. The same manure produced by the method I employ is, therefore, worth more than double that obtained with the use of movable pails. It is easy to perceive from the way in which the moss manure becomes lighter in colour on the surface, that it loses water very rapidly. I ascertained this loss to be 9·6 per cent in 24 hours without stirring. Still without disturbing the sample, the loss was 30·7 per cent in five days. After stirring and exposure at ordinary temperatures for three days more, the additional loss was 11·1 per cent, making the total loss in eight days, 41·8 per cent, while the original percentage was 60·6. I thus found that there would be no difficulty, the manure being perfectly odourless, in carrying out this drying on a large scale.

Owing to a slight development of ammonia in the product above mentioned, an addition was made to it of 20 lbs. ground plaster, 1 lb. whiting, and ¼ lb. copperas. The use of the mixture thus made was continued in the closet for another month without any apparent exhaustion of its deodorizing qualities. On the 8th June the quantity of this moss manure was ascertained to be 99·5 lbs., and it was again carefully sampled and analyzed. It contained as follows:—

	Per cent.	Fertilizing Constituents. Per ton.		Value. per ton.
		Lbs.	Price	
Moisture	76·82			
Organic substances	17·30			
With 1·15 total Nitrogen		23	13c.	$2·99
Ash	5·88			
With 0·51 Phosphoric Acid		10·2	5c.	0·51
" 0·13 of Potash		2·6	5¼c.	0·14
	100·00			$3·64

With reference to the 1·15 per cent of nitrogen above mentioned it has to be stated that 0·60 was in the form of ammonia, and that no nitric acid was present.

Without being stirred this manure loses 40 per cent moisture in ten days. After drying a sample of it artificially at 90° C. it became quite brittle, was easily ground, and an analysis yielded the following results:—

	Per cent.	Fertilizing Constituents. Per ton.		Value. Per ton.
		Lbs.	Price	
Moisture	2·16			
Organic substances	71·36			
Containing 3·46 total Nitrogen with 0·92 as ammonia		69·2	13c.	$8·99
Ash	26·48			
Containing 2·52 Phosphoric Acid		30·4	5c.	2·52
" 0·65 Potash		13·0	5¼c.	0·68
	100·00			$12·19

After allowing this moss manure, with frequent stirring, to become apparently air dry at ordinary temperatures, the product of this first experiment, called E No. 1, showed the following composition and value:—

	Per cent.	Fertilizing Constituents. Per 2000 lbs.		Value. Per ton.
		Lbs.	Price	
Moisture	14·16			
Organic matter	72·62			
Containing 3·16 total Nitrogen		63·2	13c.	$8·22
Ash	13·22			
Containing 2·52 Phosphoric Acid		38·4	5c.	1·92
" 0·65 Potash		37·2	5¼c.	1·95
	100·00			$12·09

The 3·16 of nitrogen above mentioned (which is equivalent to 3·84 per cent ammonia in the original moss manure) was present in the following conditions:—

As Organic Nitrogen	0·56
As Ammonia	2·42
As Nitric Acid	0·18
	3·16

It thus appears that during the air drying the greater part of the original organic nitrogen is converted into ammonia and fixed by the plaster and copperas, but not further changed into nitric acid.

From June until November, 1901, additional experiments were carried on in the dry moss closet, different substances being used in each for fixing the ammonia. In the following tabular statement the particulars of these experiments are given, each treatment being distinguished by the letter and number given to their respective products (moss manures) on analysis:—

	E. No. 2.	E. No. 3.	E. No. 4.
Materials used :	Lbs.	Lbs.	Lbs.
Moss litter	5·52	5·52	9·17
Superphosphate	1·00	1·00	
Sulphate of Potash		1·00	
Ground Plaster			1·00
	6·52	7·52	10·17

	E. No. 2	E. No. 3	E. No. 4
	Lbs.	Lbs.	Lbs.
Moss manure produced	37·75	33·55	70·00
" " dried	13·17	17·47	15·61
Analysis of the latter:			
	p.c.	p.c.	p.c.
Moisture	30·74	33·16	13·65
Organic matter	49·82	49·14	....
Ash	19·44	17·70	... .
	100·00	100·00	
Nitrogen:			
	p.c.	p.c.	p.c.
Organic	1·74	1·26	1·76
As Ammonia	1·64	0·92	1·54
As Nitric Acid	0·04	0·10	0·00
	3·42	2·28	3·30
Phosphoric Acid	3·43	3·04	0·32
Potash	3·72	3·24	1·84
Value of the fertilizing constituents at the rates already mentioned	$16·23	$12·37	$10·83

There is good reason for believing that the dry moss system could be also advantageously applied to public urinals by causing it when once used to be dried by exposure to air under agitation, to be resaturated in the urinal, and repeating these processes as long as found practicable. A laboratory experiment in imitation of such treatment may here be noted. The quantity of moss litter used for it was 158 grammes, and to this there were added, from time to time, 14·15 grammes of ordinary oil of vitriol diluted with water. To this mixture fresh urine was added whenever the evaporation of the excess of moisture rendered absorption possible. This experiment lasted for about three months, and at the end the mixture weighed 474 grammes, which decreased on air-drying to 346 grammes. A sample of this, marked moss manure, U No. 1, gave:

Moisture	39·94 p.c.
Organic matter	35·66
Ash	24·40
	100·00

The fertilizing constituents and their values were as follows:—

	Per cent.	Fertilizing Constituents. Per 2000 lbs.		Value. Per ton.
		Lbs.	Price	
Nitrogen :				
Organic	0·53			
As Ammonia	2·45			
As Nitric Acid	0·22			
	3·20	64·0	13c.	$8·32
Phosphoric Acid	1·16	23·2	5c.	1·16
Potash	1·34	26·8	5¼c.	1·41
			Total	$10·89

The product of the experiment just described was found perfectly capable of absorbing fresh quantities of urine, and of giving off only its moisture, retaining the dried matter and its manurial constituents. 410 grammes of it mixed with 150 of fresh moss litter were, in the course of eighteen days treated with 2,206 grammes of urine and exposed to evaporation in various ways at ordinary temperatures. The resulting manure weighed 483 grammes. During the experiment 2,283 grammes of water had, therefore, been evaporated by the instrumentality of 522 grammes moss litter. Calculated on the weight of the latter this amounts to 437 per cent, or, in other words, the moss litter was capable of dissipating 24 per cent of its weight of moisture per diem. This is the average of various modes of treatment, the rate of evaporation increasing from 10 to 100 per cent, according as the moss was kept in a mass 6 inches in diameter, spread out in a thinner layer, or agitated more and more vigorously. The capability of dry moss or moss litter for absorbing moisture is sufficiently well known, but its property of also giving it off to the atmosphere does not yet appear to have been appreciated, and it is this quality which will be found valuable in the manufacture of concentrated manures from human refuse.

I may say that these experiments are not by any means completed, and that I expect to obtain even more favourable results than those I have described. But, without considering future possibilities, I consider myself justified in maintaining that I have already practically demonstrated that human refuse need no longer be a source of danger to the public health, nor a cause of expense to any community. Indeed, it can be so treated, either privately or under municipal management, as to become a source of profit to towns and cities, and a great advantage to agriculture. The value of town excreta has been estimated by different German authorities at from 370,000 to 1,500,000 marks annually per 100,000 of population. Heiden places it at 10·38 marks per individual per annum. I believe that a conservative estimate in this country would be $2 .— annually per person, and that the collection could be made by the dry moss system, so as to leave a handsome profit. Of course, difficulties will be encountered; there is no beneficent project that is not beset with such. Among the greatest of these will be the indifference of the individual, who, for the last thirty years has been urged to follow methods, such as the water-borne system, which lead in an entirely different direction. Let us hope, however, that when our municipal authorities are shown "a more excellent way" they will no longer be parties to the pollution of our rivers and lakes, but, remembering that "cleanliness is next to godliness," will endeavour to persuade their various populations to take heed to the commandment of Moses, which says: — "Turn back, and cover that which cometh from thee."

X.— *On Excited Radioactivity.*

By MR. R. M. STEWART.

Advanced Student, University of Toronto.

(Communicated by President Loudon and read by Professor J. C. McLennan May 27, 1902.)

(I.) INTRODUCTION.

Professor Rutherford[1] has shown that air which has been passed over thorium oxide, or other compounds of thorium, possesses the power, in the absence of an electric field, of imparting radioactivity to any body with which it comes in contact.

He also found that when this air is drawn into a receiver containing a negatively charged conductor, the excited radioactivity at ordinary pressures is confined entirely to the negatively charged body and does not appear to be induced in any degree on the walls of the receiver.

On the other hand, when a positively charged wire is inserted in the receiver containing air which has been passed over thorium, the walls of the containing vessel become radioactive but the positively charged wire does not.

Quite recently Elster and Geitel[2] have found an analogous effect when a negatively charged body is exposed in atmospheric air. They find that negatively charged conductors, on being exposed for some hours in the open air, gradually become radioactive, while conductors which are positively charged remain inactive.

This radioactivity which is excited or induced is of a temporary character and does not persist after the exposure, but decays in the course of a few hours. In this respect it is very similar to the activity excited by the action of thorium compounds.

From these results it would appear that excited radioactivity can be communicated in an electric field only to conductors which are negatively charged.

In his paper on radioactivity induced by the action of thorium compounds, however, Rutherford[3] describes an experiment which suggested the possibility of concentrating radioactivity under certain conditions upon positively charged conductors, as well as on those which carry a negative charge. In describing his experiments upon the amount of excited radioactivity communicated in air at different pressures to metallic conductors in the presence of thorium oxide, he states that, in air at very low pressures, he found a negatively charged rod became but feebly radioactive, while the sides of the vessel, on the contrary, which contained the oxide, the negatively charged rod and the attenuated air, exhibited a strongly excited radioactivity.

---

[1] E. Rutherford, Phil. Mag., 49, page 1 and page 161, 1900.

[2] Elster & Geitel, Physikalische Zeitschrift, No. 40, page 590.

[3] E. Rutherford, Phil. Mag., page 186, Feb., 1900.

As the thorium oxide was enclosed in a paper envelope, and so was not in direct contact with the sides of the vessel, this experiment indicated that the emanation which was the cause of the excited radioactivity could be concentrated under certain circumstances, on a positively charged body, although the effect was found generally associated with one which carried a negative charge.

This experiment led the author to examine the effect discovered by Elster and Geitel more closely, and, among other points, to see if radioactivity was not excited, even feebly, on a positively charged conductor exposed in free air.

A series of experiments was made during a period extending over some months with conductors exposed to the air in a large room in the Physical Laboratory, as well as with some exposed to the free air outside, and it was found that not only did conductors which were negatively charged become radioactive, but at times those which were positively charged also acquired a marked, though feeble, radioactivity. The following paper contains an account of the experiments dealing with radioactivity excited in positively charged bodies, together with a few observations on some of the causes which affect the intensity of the activity imparted to conductors exposed with a negative charge.

(II.) Apparatus.

In conducting these experiments the radioactivity was detected by means of an electroscope similar to that devised by C. T. R. Wilson[1] for the purpose of investigating spontaneous ionization in air and other gases. The instrument is shown in Fig. I.

A thin strip of brass, *A*, was suspended vertically in a small metallic box, *B*, by means of an insulating bead of sulphur, *C*. To this strip there was attached a gold leaf whose deflexions, observed with a micrometer microscope through a mica window in the apparatus, gave a measure of the potential of the brass strip.

A brass rod, *D*, which supported the measuring system, passed through an ebonite plug, *E*, and was connected to one of the terminals of a battery of small storage-cells, the other terminal of the battery being joined to the case of the electroscope.

---

[1] C. T. R. Wilson, Proc. Roy. Soc., Vol. 68, p. 154.

A fine steel wire which was attached at its upper end to the rod, *D*, extended below the sulphur bead, and was there bent into a loop surrounding the brass strip. This steel wire could be readily drawn into contact with the strip, *A*, by means of a small magnet, and the measuring system by this operation was raised from time to time to any desired potential.

The apparatus was also provided with a movable base, *G*, and bodies to be tested for radioactivity were placed in the electroscope resting on this base.

Besides having a small capacity, this measuring system possessed the advantage of being entirely free from leakage along its supports. In practice the conducting rod *D*, was maintained throughout any measurement, at the initial potential of the gold leaf, and, consequently, when the latter indicated any loss of charge, it was evident that such loss arose from a leakage through the gas surrounding the measuring system. Any conduction across the sulphur bead could only be in such a direction as to partially counteract the loss arising from leakage through the gas.

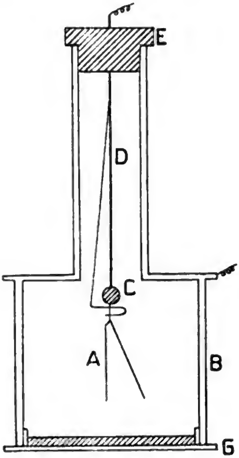


Fig. I.

In operating the electroscope, it was found that a potential of 150 volts applied to the system produced a convenient deflection of the gold leaf, and, as this voltage was ample to produce the saturation current under spontaneous ionization, it was adopted generally throughout the investigation as the standard.

With the scale provided in the micrometer, readings could be made to ·01 mm., and, as the microscope in a measurement was always adjusted so that a movement of one-tenth of a millimetre corresponded approximately to a fall in potential of one volt, it was possible to measure without difficulty a change of a fraction of a volt in the potential of the gold leaf.

(III.) RADIOACTIVITY COMMUNICATED TO NEGATIVELY CHARGED BODIES.

For the purpose of the investigation, a series of circular discs was cut from a thin sheet of zinc of such a diameter as to fit snugly into the movable base, *G*. The method followed in the experiments was to place one of these discs, after having cleaned it carefully with fine emery paper, on the base of the electroscope, charge the gold leaf to 150 volts and then observe its rate of fall under the conductivity arising from spontaneous ionization in the vessel. When this rate was ascertained, the disc was removed from the electroscope and suspended by an insulating support in some selected position. A wire was led from it to one terminal of a Toepler Holtz machine and the second terminal of the machine was joined to earth through a water main.

The disc was then maintained at a potential of about 11,000 volts, positive or negative as desired, for a selected time, and afterwards replaced in the electroscope and the rate of leak again determined. Any increase observed in the rate of fall of the gold leaf was taken as a measure of the intensity of the radioactivity acquired by the zinc plate during its exposure.

A preliminary set of measurements was made on the amount of radioactivity excited in a series of discs suspended in a large room in the Physical Laboratory at different distances from the electrical machine which charged them. All were exposed for the same length of time under the same negative potential. On testing the discs after exposure, it was found that the radioactivity excited was much less on those discs which were suspended in close proximity to the machine than on those which occupied positions more remote.

From this result it seemed evident that air when confined in a room does not possess the power of imparting radioactivity to bodies to an unlimited degree, and that whatever property of this kind the air may possess initially, it is gradually deprived of it in the pressure of an electric field such as that produced by an electrical machine in action.

In corroboration of this conclusion, it may be stated that some observations were made upon the radioactivity excited in a series of discs exposed consecutively in the same position in the room while the air was kept as far as possible unchanged. The room was well aired before the experiments began, and the doors and windows were kept closed during the whole period of exposure. The results of one test are given in Table I., and they indicate a gradual decrease in the activity excited.

TABLE I.

Discs.	Time of Exposure.	Potential of Disc.	Rate of loss of charge of gold leaf, when disc was inserted in electroscope.
No. 1	First hour	11,000 volts negative	54
" 2	Second "	" " "	45
" 3	Third "	" " "	39
" 4	Fourth "	" " "	33
" 5	Fifth "	" " "	27

It was also found that after a series of experiments had been made in the room and the air had lost to a considerable extent its power of imparting radioactivity, the opening of a window and the consequent admission of fresh air was always accompanied by an immediate increase in the amount of radioactivity excited in the exposed body.

Some measurements were also made on the radioactivity excited in discs exposed, when negatively charged, before an open window in the laboratory, and a few of the results obtained are recorded in Table II. Column I. of this table gives the day upon which the exposure was made; column II. the time of exposure in hours; column III. the potential in volts of the zinc plate during exposure; column IV. the observed rate of leak in the electroscope with the unexposed zinc plate inserted, and column V. the rate of leak when the zinc plate was replaced in the electroscope after exposure.

TABLE II. FOR NEGATIVE EXPOSURES.

Date	Time of exposure in hours.	Potential of exposed plate in volts.	Loss of charge in volts per hour, under spontaneous ionization alone.	Loss of charge in volts per hour under activity of exposed plate.
Oct. 30, 1901	1	12000 negative	1·9	19·2
" " "	1	" "	1·9	17·7
" 31, "	4	" "	1·7	10·8
" " "	4	" "	1·7	17·7
Nov. 6, "	7	" "	3·2	36·0
" 7, "	10·5	" "	2·9	36·0
" 13, "	14·5	" "	2·8	34·5
Jan. 10, 1902	18·0	28000 "	2·4	26·7
" 15, "	21·5	25000 "	2·5	14·4

From the numbers given in column IV. of this table it will be seen that the conductivity of the air arising from spontaneous ionization is not constant, but varies considerably from day to day. An extended series of measurements which were made during the past winter upon the spontaneous ionization of atmospheric air confirmed these earlier results, and the numbers given above represent fairly the extent of the variations found in the conductivity of atmospheric air under normal conditions.

It was also found that there was considerable variation in the amount of radioactivity acquired by the exposed conductors when the conditions of exposure apart from the state of the air remained unchanged. Daily variations occurred in the amount of radioactivity excited, and it often happened that exposures made at different times in the same day gave quite irregular results. Examples of this type of irregularity are shown in the numbers recorded for Oct. 30th and 31st. With the wind blowing toward the window where the discs were exposed, excited radioactivity was especially strong.

(IV.) RADIOACTIVITY EXCITED IN POSITIVELY CHARGED CONDUCTORS.

Concurrently with the experiments described above, a series of exposures was made before the open window with zinc discs positively electrified. The discs were charged, as in the previous experiments, with the Toepler Holtz machine, but in this case the negative terminal of the machine was joined to earth, while the positive was connected to the exposed plate. The polarity of the machine was examined from time to time in each experiment, and in none of the tests was there any indication of a reversal of polarity during the exposure.

The results of the experiments are given in Table III.

TABLE III.

Date	Time of exposure in hours.	Potential of discs in volts.	Loss of charge of gold leaf in volts per hour with unexposed plate.	Loss of charge of gold leaf in volts per hour with exposed plate.
Oct. 30, 1901	1·0	12000 positive	1·9	3·7
" " "	1·0	" "	1·9	2·6
Nov. 4, 1901	4 0	" "	3·0	3·0
" 5, "	10·0	" "	2·2	7·6
" " "	4·0	" "	2·2	3·1
" 6, "	10·0	" "	3·2	5·2
" 7, "	7·0	" "	2·9	5·1
" 14, "	14·5	" "	3·3	3·3
Jan. 15, 1902	17·0	28000 "	3·3	3·5

From the numbers given it will be seen that, while on some days the positively charged discs gave no indication of excited radioactivity, on other days there was clear and distinct evidence that a feeble but well marked radioactivity had been excited in them, although they were positively charged when exposed. In order to make certain that the observed increase in the rate of leak was a true effect and not due to the gradual dissipation of a small charge adhering to the discs, they were all carefully cleaned and polished before being exposed. The increase in the rate of leak, besides, was found to be the same, whether the gold leaf was charged positively or negatively.

Since the above results were obtained the experiments with positively charged discs have been occasionally repeated and, although in the majority of cases no excited radioactivity has been observed, still on several occasions the discs were found to exhibit the same feeble activity from exposure.

As the greatest care was taken to eliminate every chance of error in these experiments, it does not seem possible to arrive at any conclusion but the one that under certain circumstances, which as yet are unknown, radioactivity can be excited in conductors which are positively electrified.

I wish here to express my thanks to Professor J. C. McLennan for suggesting the investigation to me, and for his kind supervision of the work.

XI.—*The Specific Heats of Organic Liquids and their Heats of Solution in Organic Solvents.*

By J. WALLACE WALKER, M.A., Ph.D.

AND

JAMES HENDERSON, B.Sc., Ph.D.

(Read May 27, 1902.)

Although the heat of solution has formed the subject of many investigations the results obtained have aided very little in the development of our ideas regarding the nature of this phenomenon. One reason for this may be that the materials mostly employed as solutes have been chosen from the class of substances called electrolytes, whose thermal behaviour on solution is known to be greatly complicated by ionic dissociation. A second reason is also most probably to be found in the nature of the solvent employed, viz., water. Ramsay and Shields have shown from surface tension measurements that water in the liquid form has not the simple molecular formula H_2O, but $[H_2O]_n$ where n is about 1·7 at the freezing point and decreases with rise of temperature. It is hardly to be imagined, therefore, that the total heat change during solution in such a solvent, except at great dilution, is due to the solute. Some of it is most likely to be attributed either to the splitting up of the complex water molecules into simpler ones, or to the condensation of simple into complex molecules. A further source of complication is also to be found in the fact that many of the substances investigated are crystalline solids, and an unknown amount of heat is certainly involved in their passage from the crystalline condition. It seems, therefore, probable that if a generalization is to be derived at all from such observations, substances should be chosen for examination whose structure is of the simplest nature, and where there is least cause to attribute part of the thermal effect to any kind of chemical interaction. The work of Ramsay and Shields has demonstrated that water, the alcohols and the liquid aliphatic acids are all substances of a considerable degree of molecular complexity, while the hydrocarbons and the esters, along with many other liquids, consist almost entirely of simple molecules. The latter, therefore, form the ideal class to choose as solvents.

Qualitative. The results of a few preliminary experiments confirmed this conclusion and indicated the main lines of the investigation.

When the following solutions were made, the change in temperature $\triangle\ \tau$ was observed:—

	$\triangle\ \tau$
32 grams Methyl Alcohol in 100 grams water	+ 8·50°
46 " Ethyl " " "	+ 8·30°
60 " n-Propyl " " "	+ 4·00°
58 " Acetone " " "	+ 7·60°
92 " Glycerine " " "	+ 4·70°
100 c.c. Toluene in 100 c.c. Benzene	— 0·37°
Equal volumes of Acetic Ether and Benzene	— 0·55°
" " Toluene	— 0·50°
" Aceto Acetic Ether and Benzene	— 1·00°
" Toluene	— 1·00°
" Quinoline and Benzene	— 0·10°

The first five are mixtures of an associated liquid with an associated solvent and the heat change is a large one. In the remainder the liquids are both non-associated and the heat change is small. It is also of opposite sign. These results seem to point to the conclusion that the main source of the thermal effect in the solution of such substances is due to the dissociation of molecular aggregates and this was confirmed by a few more roughly qualitative experiments in which the mixing was done in a test tube using 5 c.c. of each liquid at the same temperature.

Methyl Alcohol and Ethyl Alcohol	$\triangle\ \tau =$	+ 0·65°
" " n-Propyl Alcohol		+ 0·8°
Ethyl Alcohol " " "		+ 0·8°
Benzene and Ethyl Alcohol		— 5·7°
Toluene " "		— 5·2°
m-Xylene and "		— 4·5°
Benzene and n-propyl Alcohol		— 3·0°
Acetic ether and Ethyl Alcohol		— 7·2°

There is, therefore, a very small heat effect on mixing the alcohols with each other — a result quite in accord with the idea of association. For being so similar in nature and in degree of molecular complexity any influence which the methyl alcohol might be expected to have in breaking down the aggregates of ethyl alcohol would apply equally to its own aggregates. A very remarkable fact, however, is that, whereas all mixtures of water and the various alcohols with each other give out heat, in every other case that has been examined the heat change is negative. The above values show also that the amount of heat absorbed during the solution of an associated liquid in an unassociated solvent is by no means inconsiderable, while, when both liquids are unassociated it is insignificant. A few experiments performed very recently do not show the same agreement, however, with this theory of the cause of the phenomenon. When acetone is dissolved in acetic ether there is very little heat change, yet acetone is an associated liquid. Aniline is unassociated, and yet when mixed with an equal volume of benzene, the temperature falls 3·3°. A still more surprising result was obtained with rhigoline B.P. 30°—40° which is almost pure pentane and from analogy unassociated. When mixed with an equal volume of benzene there was a fall of 4° in temperature. Gasoline B.P. 70°—80° gave a similar result with benzene, and with the unassociated acetic ether as great a depression as with the associated acetone, viz., 5°. It was thought that a determination of the molecular weight might throw some light upon the results, but a determination by the freezing point method gave 73 as the molecular weight of rhigoline in benzene, instead of 72, the theoretical value for pentane.

Quantitative. In determining with any degree of accuracy the heat change during solution it is, of course, necessary to know the specific heat of the resulting solution. The latter cannot be taken as a mean of that of the two constituents. For this purpose an electrical method was adopted, a certain very constant current sent through a small incandescent lamp, which was entirely immersed in the liquid contained in a silver vessel, serving as the source of heat. The lamp was 16 c.p. at 50 volts, and had, instead of a metal socket, a glass tube fused on the end through which the copper leads passed. The current was measured by a Weston ammeter and voltmeter, and could be read in each case to at least 1 part in 500. The thermometer employed was of thin glass with a long, narrow bulb and an enclosed milk-glass scale. It was graduated in $^1/_{20}$ths of a degree, and could be read with accuracy by means of a lens to 0·015°. The calorimeter was provided with a well-fitting lid in which were holes for the various accessories. It was arranged otherwise as described by Ostwald in his Hand und Hilfsbuch. The stirring was done by hand, two thin platinum wires passing through the lid serving to raise and lower the stirrer. The same volume of liquid was used in every experiment. The method seems at first sight to have several grave sources of error, and it is doubtless not one of extreme accuracy, but as the experiments were all made under the same conditions, and are all relative to the specific heat of water which is taken as unity most of these errors ought to have been eliminated. The results obtained are, of course, the best test of efficiency. In the following determinations of the water value of the calorimeter the bath was very nearly 16°, and the heating was applied from a few degrees below to an equal amount above that temperature.

TOTAL LOSS OF CALORIES PER DEGREE.

No. 1	20·4	No. 4	21·3
No. 2	20·5	No. 5	19·9
No. 3	20·3	No. 6	20·1

The mean of these numbers 20·4 is taken as the correction to be applied when other liquids were being examined. As the total energy supplied per degree is 15 times this value, the error of the method must be small. The following are the results obtained for the specific heats of several organic liquids between 10° and 20°. The third column contains the results given by others for approximately the same temperatures:

Benzene	0·406	0·340 at 10°	De Heen and Deruyts.
	·404	0·482 " 40°	
	·405		
	·406	0·400 at 15°	Schiff.
Mean	0·405		
Toluene	0·391	0·3638 at 10°	DeHeen and Deruyts.
	·390	0·400 " 15°	Schiff.
Mean	0·391		
m-Xylene	0·389	0·400 at 15°	Schiff.
	·388		
Mean	0·389		
Nitrobenzene	0·339	0·3438 at 10°-20°	Regnault.
	·340		
Mean	0·340		
Aniline	0·474	0·512 at 8°-82°	Schiff.
	·477		
Mean	0·476		
o-Toluidine	0·473	0·5038 at 12°-83°	Schiff.
	·471		
Mean	0·472		
Chlorbenzene	0·305	0·325 at 7°-64°	Schiff.
	·307		
Mean	0·306		
Phenetol	0·433	0·4417 at 15°	Schiff.
	0·433		
Quinoline	0·342	No data	
	·349		
Mean	0·346		

Methyl Alcohol	0·601	0·6009 at 15°-20° Regnault.
	·601	
	·601	
	·603	
Mean	0·601	
Ethyl Alcohol	0·612	
	·607	0·6019 at 16°-30° Schüller.
Mean	0·609	
n-Propyl Alcohol	0.555	0·615 at 16°-64° Schiff.
	·557	0·659 at 21°-23° Pagliani.
Mean	0·556	
Acetone	0·486	
	·492	
Mean	0·489	
Methyl Acetate	0·465	0·4548 at 15° Schiff.
	·463	
	·466	
Mean	0·465	
Ethyl Acetate	0·458	0·4548 at 15° Schiff.
	·459	
	·458	
	·457	
	·456	
Mean	0·458	
iso-Amyl Acetate	0·449	0·4548 at 15° Schiff.
	·451	
Mean	0·450	
Methyl Propionate	0·463	0·4548 at 15° Schiff.
	·460	
Mean	0·462	
Ethyl Propionate	0·460	0·4548 at 15° Schiff.
	·458	
	·460	
	·457	
Mean	0·459	
Ethyl Oxalate	0·426	
	·427	
Mean	0·427	

When determining the heat of solution the lamp was removed from the calorimeter, the water value of the latter was then found to be 11·64 calories per degree. The heat of solution was determined by placing a weighed quantity of the solvent in the calorimeter, and, after it had attained a steady temperature, running into it a certain amount of the solute of the same temperature from a water-jacketed tube. The quantities were so chosen as to give a final volume of approximately 260 c.c. in each experiment. The mixture was stirred rapidly for ¼ minute and a reading taken. Several successive readings were taken at intervals of ½ minute. The calorimeter was then weighed, the difference giving for large quantities of solute the amount taken. In making the more dilute solutions 5 c.c., 3 c.c., 2 c.c., and 1 c.c., pipettes were used. The specific heat of the solution was then determined as in the case of a pure liquid. The results are expressed in the following manner — the number of grams of solvent to 1 gram molecule of the solute is calculated for each degree of dilution and the corresponding number of calories.

I. ALCOHOLS IN BENZENE.

Solute	Solvent	Sp. Heat	Cal.
Methyl alcohol..........	78.2 gr.	0·481	241
Ethyl alcohol............	76·3 "	0·511	403
n-Propyl alcohol..........	63·5 "	0·491	317

II. ALCOHOLS IN TOLUENE.

Solute	Solvent	Sp. Heat	Cal.
Methyl alcohol................	91·6 gr.	0·473	237
Ethyl alcohol......	90 "	0.495	374

III. METHYL ALCOHOL IN M-XYLENE.

Solute	Solvent	Sp. Heat	Cal.
Methyl alcohol	99·3 gr.	0·469	260·5

IV. ALCOHOLS IN ETHYL ACETATE.

Solute	Solvent	Sp. Heat	Cal.
Methyl alcohol	90 gr.	0·497	421
Ethyl alcohol	87·5 "	0·515	566

V. ETHYL ALCOHOL IN CHLOROBENZENE.

Solute	Solvent	Sp. Heat	Cal.
Ethyl alcohol	268·2 gr.	0·398	658

In these experiments, the concentrations are somewhat divergent, but they are close enough to suggest that the heats of solution of methyl alcohol in the three solvents, benzene, toluene and xylene are almost identical, but very different from the value obtained for the same substance in ethyl acetate. Also the heat of solution of ethyl alcohol is seen to be very different from that of methyl alcohol in the same solvents. To test these points further it is, however, necessary to examine solutions of varying degrees of concentration, and this work has been commenced. Ethyl alcohol has been examined in solutions in benzene, toluene and nitrobenzene, as well as to a less extent in phenetol. The results are expressed in the same terms as the foregoing.

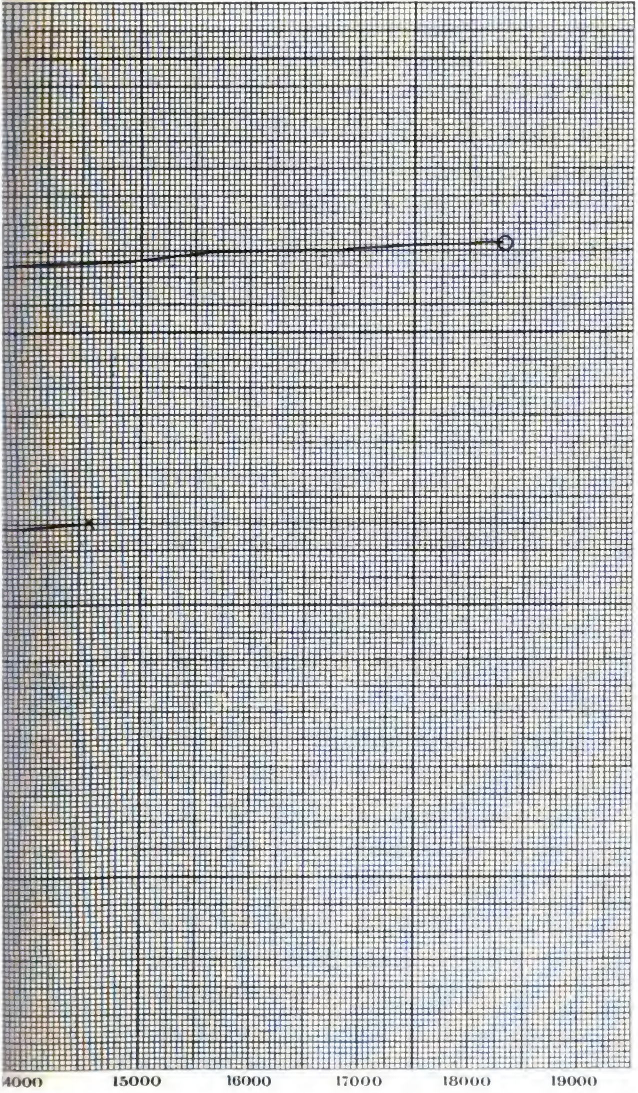
Benzene	Specific Heat	Cal.
80·96 grams	0·528	437
123·87 "	·511	578
210.99 "	·497	806
483·21 "	·460	1255
1301·1 "	·428	2132
2627·1 "	·417	2901
4457 "	·414	3584
6721 "	·410	3974
13433 "	·406	4032

Toluene	Specific Heat	Cal.
80·2 grams	0·513	332
208·3 "	·470	628
469·6 "	·442	1034
1248·2 "	·419	1803
2584 "	·407	2594
4405 "	·399	3205
6645 "	·395	3515
13222 "	·391	3815

Nitrobenzene	Specific Heat	Cal.
110·78 grams	0·457	612
288·8 "	·415	1090
653 "	·379	1629
3580 "	·348	2851
6100 "	·345	3075
9204 "	·342	3156
18328 "	·341	3330

Phenetol	Specific Heat	Cal.
89·08 grams	0·537	409
7397 "	·445	1973
14600 "	·433	2300

From these tables, and still more from the curves in which the calories are plotted as ordinates and the grams of solvent as abscissæ, it is evident that the heat of solution of alcohol in benzene, although nearly the same, is not identical with that in toluene. Still the curves lie very close together and run nearly parallel throughout their entire length. Whether the final value at infinite dilution is the same for both or not is, of course, doubtful. If its cause is solely disassociation of the molecular aggregates of alcohol it ought to be so, but a comparison of these results with those for nitrobenzene, and especially phenetol, make this conclusion improbable. The curve for nitrobenzene shows that the maximum value has been almost reached, and it is much lower than those for benzene and toluene, while at the greatest dilution reached with phenetol it is only about half the value of the latter. Further experiments with other solvents and solutes are in progress.


4000
15000
16000
17000
18000
19000

XII.— *Oudemans' Law and the Influence of Dilution on the Molecular Rotation of Mandelic Acid and its Salts.*

By J. WALLACE WALKER, M.A., Ph.D.

(Read May 27, 1902.)

From an examination into the influence of dilution upon the property possessed by solutions of the salts of the alkaloids of rotating the plane of a beam of plane-polarized light, Oudemans deduced the law that in dilute solution the molecular rotatory power of an alkaloid is independent of the nature of the acid with which it is combined. For example, he found that solutions containing a molecular weight of quinine in 20 litres of water showed approximately the same rotatory power when combined with the following acids:

Acid	HCl	HNO_3	$HClO_3$	$C_2H_4O_2$	CH_2O_2	H_2SO_4	$C_2H_2O_4$	H_3PO_4	$HClO_4$
M_D	–279°	284°	286°	279°	281°	279°	272°	280°	288°

Similar results were obtained for a number of other alkaloids by Oudemans, Schwebel, Carrara, and others.

Landolt examined in a similar way the metallic salts of the optically active tartaric acid and arrived at a similar conclusion, viz., that in dilute solution the molecular rotation is independent of the nature of the metallic constituent of the salt. The values for the neutral salts were

	Li	*Na*	*K*	NH_4	*Mg*
	+38·6°	39·9°	43°	42°	41·2°,
for the Acid Salts	+28·5°	27·5°	28·3°	28·5°	——

van't Hoff in his "Die Lagerung der Atome im Raume," p. 103, gives a table of fifteen such acids whose salts have been examined in this way, and I have since, along with Professor Purdie, investigated lactic acid along the same lines. In the main the results obtained sustain the conclusion that, although the molecular rotations of the various salts of an optically active substance may differ from each other in concentrated solutions, they all, on dilution, approach the same value.

This law, like so many others regarding the dilute aqueous solutions of salts fell at once into line with the ionic theory of solution, for, according to the latter, these dilute solutions of the salts of the alkali metals and of the strong acids contain but few whole molecules of the salt. The molecules have become dissociated by dilution into separate ions, and, therefore, the dilute solutions of different salts of an optically active acid contain the same unit upon which the amount of this activity depends, viz., the optically active ion. Exceptions found to the law are as numerous as the agreements with it, but these are explained as due to incomplete dissociation, *e.g.*, in the case of Ba, Sr, Ca, Mg, etc., salts. Entire agreement is only to be looked for at high dilution, and in the case of the Li, Na, K, and NH_4 salts. With one exception, however, the acids examined are possessed of a comparatively low rotatory power — never above 50° — and so the degree of dilution to which their change of molecular rotation can be accurately followed with any ordinary polarimeter is very limited — in fact, scarcely within the limits where agreement with the ionic theory would be expected. On this account, having prepared a quantity of active mandelic acid for other purposes, it seemed worth while to first employ it for this investigation, as it is a very active substance, having a molecular rotation of about 200°.

The acid employed was the dextro modification, and it was obtained by fractional crystallization of the quinine salt of the inactive acid. It melted, sharp, at 132·5°, and had a specific rotation of + 154·2° in 2 per cent solution at 17°. The salts were not prepared in the free state but by neutralizing a weighed quantity of the acid by a standard solution of the hydroxide in the case of the sodium, potassium, and ammonium salts, and by the theoretical quantity of the pure carbonate in the others. This solution was then diluted to ½ normal or ¼ normal, and from these the various other concentrations were prepared by the use of calibrated pipettes and flasks. The results obtained for the molecular rotations of the various salts are contained in the following table. The observations were made at 15°.

CONCENTRATION.	½ N	¼ N	⅛ N	$\frac{1}{16}$ N	$\frac{1}{32}$ N	$\frac{1}{40}$ N	$\frac{1}{48}$ N	$\frac{1}{80}$ N	$\frac{1}{160}$ N
Metallic ion									
H.	243·2°	....	236·0	235·3	.... .	226·0	.... ..	220·0	221·5
Li.	185·6	182·4	181·2	180·8	....	182·0	....	....	..... .
Na.	187·4	.... .	......	183·0	.... ..	180·0	....	..... .	183·0
K.	182·5	180·0	180·2	180·0	179·6	181·6	....	....	......
NH_4	181·6	180·4	179·4	179·0	178·9	182·0	.... ..	....	.....
Ba.	....	192·6	191·0	189·0	188·6	189·0	....	....	... .
Sr.	....	199·2	193·0	191·5	187·5	. .....	189·0	....	.. ....
Ca.	....	218·4	210·0	203·0	200·3	....	192·4	....	......
Mg.	....	198·0	194·4	191·0	190·5	......	191·3	......	....

An examination of the table shows that the molecular rotations of all the salts decrease with dilution, and, that in the case of Li. Na.

K. and NH_4 they soon reach an almost constant value of 180°, as the ionic theory predicts that they should, also that at the greatest dilution examined, the Ba. Sr. Ca. and Mg. salts have not yet reached this limit, a result also in conformity with the ionic theory, for these salts especially those of Ca. and Mg. are considerably less dissociated than those of the alkalies at the same concentration. According to van't Hoff (loc. cit.), therefore, we should take 180° as the rotation of the mandelic ion in aqueous solution. Mandelic acid, even in the most dilute solution in which it could be examined, shows a wide departure from this value and this again is predicted by the ionic theory, for the molecular is much greater, evidently, than the ionic rotation, and like all the organic acids which are only half electrolytes, mandelic acid is but slightly dissociated at these concentrations. The progress of ionization with dilution is, however, clearly indicated in passing from a $^1/_2$ N. to an $^1/_{80}$ N. solution. Even in the $^1/_2$ N. solution, however, there are some ions present as well as possibly molecular aggregates possessing a different rotatory power from the simple molecule, so that we are not justified in taking 243° as the value for the latter. If, however, a sufficiently large number of H-ions are present in the solution of mandelic acid they will, according to the law of mass action, decrease the ionization of that substance to a negligible amount. This condition of things has been attained by dissolving the acid in normal hydrochloric acid and diluting, not with water, but with normal hydrochloric acid, when, as seen in the table, the molecular rotation rapidly falls to a constant value of 243°. This value may, therefore, be taken as the rotation of the simple molecule of mandelic acid.

$\frac{1}{2}$ N	$\frac{1}{4}$ N	$\frac{1}{8}$ N	$\frac{1}{16}$ N
246·7°	244°	242·7°	243·2°

Using these values, 243 for the undissociated and 180 for the entirely dissociated molecule, and applying Ostwald's dilution law for half-electrolytes to the values found for mandelic acid in pure water, a fairly satisfactory constant is obtained.

So far the results are in accordance with accepted theories, and seem to confirm Oudemans' law. But a closer inspection shows that the explanation of them is not quite so simple, and that the full interpretation of them involves something more than the ionic theory. The degree of dissociation of mandelic acid, as indicated by the change in rotation, is much greater than that calculated from the measurements of its conductivity, being already more than 30 per cent at $^1/_{80}$ N., while the latter method gives only 27·7 per cent at $^1/_{256}$ N. It is evident also that not only do the salts of the alkalies approach a constant value of 180° but that those of Ba. Sr. and Mg. approach a constant at 189° or 190°, and this at a concentration where they are still far from being entirely dissociated. Further, there are indications that, in every case except that of the Ca. salt, the rotation after falling to 180° or 190° begins to increase again. The increase is slight, and in spite of the fact that it occurs in so many instances might be attributed to errors of reading, for a mistake of two or three minutes would account for the difference, and the instrument only allowed of reading to one minute. But in a paper published subsequently to the making of these observations, Rimbach (Zeitschr für Phys. Chem., 28, 253) has examined the Na. salt to a higher degree of dilution than I was able to do with the instrument at my disposal. He finds that at about $^1/_{30}$ N. the rotation begins to increase and continues to do so till $^1/_{80}$ N. is reached, when it decreases once more.

As these solutions are more dilute than any of those upon which the Oudemans-Landolt law is based, the latter can scarcely be accepted for the present as entirely confirmed. It is my intention to examine both the salts of mandelic acid and those of other active substances in a more powerful instrument and at greater dilutions to see whether these abnormalities can be detected and confirmed.

XIII.—*An Abnormal Result in the Hydrolysis of Amygdaline.*

By J. WALLACE WALKER, M.A., Ph.D.

AND

W. S. HUTCHINSON, M.Sc.

(Read May 27, 1902.)

The glucoside amygdaline $C_{20}H_{27}NO_{11}$, as is well known, when heated with dilute acids, is split up into glucose, benzaldehyde and hydrocyanic acid, the reaction consisting in a combination of the substance with the elements of water. When amygdaline is treated with strong hydrochloric acid at a temperature of 100° C. for two hours the glucose is converted into a charred mass, and the aqueous extract contains ammonium chloride and laevo-rotatory mandelic acid. One of us has had occasion to convert large quantities of amygdaline into active mandelic acid by the above method, but the yield was always much below the theoretical. A somewhat larger quantity was obtained by using hydrochloric acid of specific gravity 1·12. The loss was not due to the production of the inactive variety, although the formation of the latter might, from analogy with the behaviour of tartaric and malic acids under similar conditions, be expected on heating the active with a strong mineral acid. As amygdaline is an exceedingly expensive substance it was thought advisable to try the hydrolysis in another way.

When amygdaline is boiled with alkalies the nitrogen atom only is split off as ammonia, but the glucose is not separated from the remainder. It remains combined in the form of an acid called amygdalinic acid, a quantitative yield of the latter being obtained, and it was expected that the substance could then be resolved quantitatively into glucose and active mandelic acid by boiling with dilute hydrochloric acid. The first part of the expectation was fulfilled, the reaction went quantitatively, but instead of active mandelic acid, the inactive modification was alone produced.

The method we adopted was to boil the amygdaline with a slight excess of barium hydroxide solution till all the ammonia was expelled, then add enough normal hydrochloric acid to combine with all the barium, and leave a gram molecule in excess for every gram molecule of amygdaline taken. This solution was then boiled for six hours on the water-bath, polarimetric readings being taken every hour till there was no further change in rotation. When cold, it was extracted with ether. The ether left on evaporation a crystalline acid which, when recrystallized from benzene, melted at 118°— the melting point of inactive mandelic. Its aqueous solution was quite inactive when examined in the polarimeter.

Two other experiments were performed using 2 N. HCl to effect the hydrolysis of the amygdalinic acid, but the result was the same. Inactive mandelic acid was the product in each case.

Fearing that the inversion to inactive might have been caused by boiling with an excess of baryta, we performed another experiment in which the latter was added in small quantities with a final slight excess, but the product was again inactive mandelic acid.

In two other experiments, after precipitating the barium with the theoretical quantity of oxalic acid, we hydrolysed the amygdalinic acid with concentrated hydrochloric acid and hydrochloric acid of specific gravity 1·12 respectively, as in the preparation of the active acid from amygdaline, but again obtained the inactive acid.

In order to test finally in which stage the inversion takes place, we dissolved 25 grams of amygdaline in an excess of standard barium hydroxide solution and diluted with water to 250 c.c. The solution was examined in the polarimeter and gave a reading in the 100 m.m. tube of —4·3°. A part was then boiled under a reflux condenser for ten minutes and then rapidly cooled. Its rotatory power was now —5·55°. A second portion was boiled in the same way for thirty minutes and also had a rotation of —5·55°. The hydrolysis is, therefore, one which proceeds very rapidly and is complete after ten minutes boiling. The solution was then boiled in an open flask till all the ammonia was expelled and again made up to 250 c.c. The angle of rotation was now —5·75°, showing that the substance had not been inverted by boiling with the barium hydroxide, and this solution yielded on hydrolysing with concentrated hydrochloric acid, the inactive acid. The inversion, therefore, must take place when the hydrogen atom is being introduced in place of the glucose radical.

Wislicenus has shown that some of these so-called physical isomers are exceedingly sensitive to light, and that ordinary daylight under certain conditions can transform the one into the other. To investigate whether such was the case in the present instance or not, we hydrolysed the amygdalinic acid with normal HCl in darkness, but obtained again the inactive acid.

The same result was obtained when potassium hydroxide was substituted for barium hydroxide and the amygdalinic acid hydrolysed with ½ N. HCl.

It seems, therefore, impossible to hydrolyse active amygdalinic acid with hydrochloric acid of any strength at least above ½N. so as to obtain the corresponding active mandelic acid — the inactive racemoid is always produced. This anomalous result corresponds in some respects with the observation of Walden on active chlor-succinic acid. He found that when he attempted to replace the chlorine atom by hydroxyl and reproduce the active malic acid from which the chlor-succinic acid had been prepared, he obtained not laevo-malic acid, but the dextro-variety. Later, he observed that it was possible to obtain either dextro, laevo, or inactive by simply varying the concentration of the alkali employed. One of us also found in acting on active chloropropionic acid with sodium ethylate that inactive ethoxy-propionic acid was produced. The inactive modification represents the position of equilibrium between the two active forms. But what are the conditions tending to this point of equilibrium which are so pronounced in the case just described and so feeble in the case that seems so similar — the production of active mandelic acid directly from amygdaline?

XIV.—*On the Specific Heat of Water of Crystallization.*

By NEVIL NORTON EVANS, M.SC.

(Presented by Dr. Walker, and read May 27, 1902.)

Some time ago Prof. Walker called the attention of the writer to the fact that the specific heat of water of crystallization in inorganic compounds, as calculated from the figures given in Landolt and Börnstein's tables, was very nearly that of ice, *i.e.*, water in the solid state; and a careful calculation of the data showed that this was generally the case, although in certain instances there were very extraordinary and apparently anomalous exceptions. The number of such substances which have been examined in the hydrated and dehydrated condition is very limited, but in nine cases the specific heat of the water of crystallization only varies from 0·496 for $NiSO_4 \cdot 7H_2O$ to 0·638 for $BaCl_2 \cdot 2H_2O$. Sulphates have been chiefly investigated, but even borax and tartaric acid give values which lie close to 0·5. The intention is to redetermine with as great a degree of accuracy as possible the specific heats of these compounds and to extend the investigation to salts of organic acids, etc.

In experimentally investigating the subject the first step was to decide upon some method of determining as accurately as possible the specific heat of solids. The work so far has consisted in the elaboration and testing of a method for doing this, the determination of the conditions necessary for accurate results being the main object in view up to the present time.

From the first it appeared advisable not to employ the method of mixtures as this gives the specific heat over too large a range (*i.e.*, between the temperature to which the solid is heated or cooled and the final temperature in the calorimeter), while it is much more desirable to get the specific heat over as small a range as possible, about *eight* degrees being adopted in the present work. As it has been pretty well established that electrical methods, wherever applicable, yield much more accurate results than other methods, and as this has been amply verified in the case of liquid calorimetry by the work of Callendar and Barnes on the specific heat of water, it was decided to elaborate such a method for the intended investigation. The solid to be experimented upon is more or less finely divided and kept suspended in the liquid (in which it is insoluble) in the calorimeter by suitable vigorous stirring, and a measured quantity of heat is introduced by means of a spiral of fine platinum wire immersed in the liquid and heated by a current of electricity of known strength.

The calorimeter which has been thus far employed is made of nickel-plated copper, and is of cylindrical form, being four inches high and two inches in diameter. It is fitted with a cover having three holes, for the thermometer, stirrer and heating coil, to be described below. The size is unusually small, it having been thought desirable, among other things, to determine with how small a quantity of substance accurate results could be obtained. It has been found that a calorimeter somewhat larger than the present one would be better.

The spiral used for heating is made of one meter of pure platinum wire having a resistance of about six ohms, and wound on a frame made of mica. The ends of the wire are fused on to thick copper leads, whose free ends project some inches beyond the calorimeter, are bent over, and dip into two little mercury cups, thus connecting with the circuit outside. The current employed is obtained from six automobile accumulators of twenty-five ampere hours each, and is cut down by a resistance so that about 0·8 ampere passes through the heating spiral when it is in use. A Weston ammeter is inserted in series, and a Weston voltmeter is connected so as to give the drop of potential between the terminals of the heating spiral. A rocking mercury switch is so arranged that by its means the current can be turned through the heating spiral, or through an auxiliary resistance approximately equal to it. Before any determinations are made, the current is allowed to flow for a considerable time through this resistance in order that all connecting wires, joints, etc., may become warmed, and everything reach a steady state.

The stirrer is shaped like the propeller of a steamer, is made of copper, and fixed by means of plaster of paris to the end of a narrow glass tube which projects through the cover of the calorimeter. This tube is connected at its upper end to the vertical shaft of a tiny pulley by a short piece of rubber tubing, and the pulley is revolved by an electric fan motor to which it is connected by a belt. The speed of the motor is variable, that generally employed driving the stirrer at about 680 revolutions per minute. The blades of the stirrer are just above the bottom of the calorimeter and are curved so as to lift the mixture of solid and liquid.

The temperature is read on a mercurial thermometer (of Max Kaehler and Martini's manufacture), specially made for calorimetric work, and divided to twentieths of a degree; it is observed by means of a telescope, and readings can be made to hundredths of a degree.

The calorimeter is inclosed in two metal jackets and immersed in a large thermostat. At present the determinations are being made at room temperature, though later on it is intended to make them at a series of different temperatures.

The method of determining the specific heat of a solid as at present carried out with this apparatus, is as follows: 100 gr. benzol is introduced into the little calorimeter which is then stood in cold water till its temperature has fallen considerably below that of the thermostat. It is then wiped dry, placed in its jackets in the thermostat, and its temperature brought to nearly four degrees below that of the thermostat by passing the current through the heating spiral; then the whole is allowed to stand for at least fifteen minutes with the stirrer running. With a little practice the temperature desired (namely, four degrees below that of the thermostat) can be thus obtained to within a tenth of a degree. During the time that no current has been running through the heating spiral, it has been running through the auxiliary resistance. When the necessary time has elapsed, the temperature is accurately read, the current is quickly switched from the resistance to the spiral, and the time taken by starting a stop-watch. The readings of the two meters are then recorded each minute during the time of heating. With the apparatus employed, a current of about 0·840 amperes is used, the potential difference between the terminals of the spiral is about 5·00 volts, and the time required to raise the temperature of the system eight degrees is approximately seven minutes. When the temperature has risen to about four degrees above that of the thermostat the current is switched off and the watch stopped; the maximum thermometer reading is then accurately noted. The means of the readings of the ammeter and voltmeter are calculated, and the quantity of heat in calories introduced into the calorimeter is determined from the equation:

$$U = CVt \div 4{\cdot}1838$$

where U represents the calories, C the current in amperes, V the drop in potential in volts between the terminals of the heating spiral, and t the time in seconds during which the current is passing. By dividing the number of calories thus obtained by the number of degrees through which the system has been raised (about eight in the experiments now being carried on) the number of calories required per degree is obtained.

The determination can be repeated as often as desired by removing the calorimeter from its jackets, cooling it, and again going through the above process.

Having thus determined the number of calories required to raise the system one degree, a weighed quantity of a solid to be experimented upon is introduced in a finely ground condition into the liquid in the calorimeter and two or three determinations made in the same way as the one just described, the result giving the number of calories required to raise the calorimeter, etc., plus benzol, plus solid one degree. By subtracting the result first obtained from this one, the heat required to raise the solid one degree is determined, and dividing this by the weight of the solid in grams its specific heat is obtained.

As has been intimated above, the process requires further improvement, and the calorimeter employed must be larger; but the results already obtained seem to indicate that the method is sound in principle and capable of being modified so as to give a degree of accuracy equal to that of any method previously employed, while its carrying out is extremely simple. A few results obtained with the apparatus described are here appended:

Number of calories required to raise apparatus plus 100 grs. benzol 1 degree:

52·67
52·53
52·53
52·56
52·78

The benzol employed above was the commercial article, not specially pure.

Number of calories required to raise apparatus plus 100 grams benzol plus 58·22 grs. $BaCl_2{\cdot}2H_2O$ one degree:

65·34
65·46

Subtracting from each of these 52·61 calories, the mean of the series of the determinations above, and dividing the remainder by 58·22, the weight of crystallized barium chloride present, 0·219 and 0·204 are obtained for the specific heat of the compound. In a similar manner the specific heat of the anhydrous salt was determined—0·0817 and 0·0833. For crystallized copper sulphate (5 molecules water) the numbers were 0·322 and 0·306; and for the anhydrous compound, 0·222 and 0·218.

As will be observed, the determinations in the cases of the anhydrous compounds are much closer than in the cases of the crystallized ones, and this is to be attributed to the fact that the latter were not finely pulverized while the former, the anhydrous ones, were in the form of very fine powder. The obvious deduction is that the solid should be employed in the form of a powder as finely ground as possible. Further, means are being devised to permit of the use of a very much larger proportion of the solid, so that the heat absorbed by it may be a much larger fraction of the total. It is hoped that farther results will be ready for publication before long.

XV.—*The Variation in the Density of Ice.*

By H. LESTER COOKE, B.A.,

Demonstrator in Physics, McGill University, Montreal.

(Communicated by Professor John Cox, M.A., and read May 27, 1902.)

In spite of the many accurate researches made with a view to obtaining the absolute value of the density of ice, the problem is still far from being satisfactorily settled. The determinations made by Brunner,[1] Plücker and Geissler,[2] Bunsen[3] and others,[4] leave nothing to be desired in point of accuracy, considered singly; yet when compared with each other, the values obtained by these experimenters differ by amounts so far in excess of the probable errors of each separate research, that one is forcibly brought to the conclusion that there must be some other factor which has been overlooked.

It was owing to these considerations that Professor Nichols[5] was led to investigate this problem. One of the primary objects of his research was to discover whether this variation in the results obtained by previous experimenters was due to constant errors in the methods of observation, or was to be ascribed to an actual variation in the density itself, the various specimens of ice used in these determinations having been obtained under very different conditions. Many interesting points were brought out in this paper; a variation in the density of ice formed under different conditions being unquestionably indicated; there were also indications that the effect of time on newly formed ice was to cause its density to change, apparently approaching some normal value.

Later, some determinations of the density of the St. Lawrence River ice were made by Professor H. T. Barnes and the author, in order to ascertain what effect age would have on this value. Although the age of the specimens experimented with ranged from a few weeks to over three years, no variation in density was detected.

The object of the present paper is to offer a possible explanation of this variation. It is evident from the results of the various researches, that this variation must obey some very definite laws, otherwise much greater inconsistency would be noticed in the form of probable errors.

---

[1] Brunner, Pogg. Ann., Vol. LXIV., p. 113 (1845).

[2] Plücker and Geissler, Pogg. Ann., Vol. LXXXVI., p. 265.

[3] Bunsen, Pogg. Ann., Vol. CXII., p. 1 (1870).

[4] Trans. R. S. C., Vol. VIII., Sec. III., p. 155.

[5] E. L. Nichols, Phys. Rev., 8, 21 (1899).

The first theory that suggests itself on examining the facts is that this phenomenon has its origin in some structural alteration in the crystal itself. However, there is a simpler explanation, which appears to account for the majority of the observed facts.

The specimens of ice used in these determinations are divisible into two classes,— natural and artificial. Artificial ice may be obtained in many ways, but for the purposes of the present paper it will be sufficient to deal with three main classes. If a vessel be filled with water and immersed in a mixture whose temperature is below the freezing point, ice will form around the inside walls of the vessel— let this be called the *interior formation*. If the vessel be filled with the freezing mixture and placed in water, ice will form around the outside of the vessel — this will be referred to as the *exterior formation*. Lastly, if a long tube be filled with water, and the freezing mixture applied to the end, by gradually moving this forward as the column of water freezes, a *column* of ice will be formed without any tendency to fracture the walls of the tube.

The ice formed inside Plücker and Geissler's dilatometer affords an example of the interior formation; the ice-mantle in a Bunsen ice calorimeter is an exterior formation; while an instance of the column formation, which was first devised by Boyle, is seen in the overflow dilatometer used by Bunsen in his density determinations.

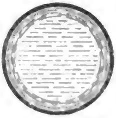


FIG. 1.

In fig. 1 is seen a section of a vessel in which the first formation is going on, the freezing mixture being applied from the outside.

Before the freezing commences, the outside surface of the vessel is approximately at the temperature of the freezing mixture, while the inside surface is very nearly at the temperature of the contained water, these being the conditions necessary to allow the heat to be conducted through the walls of the vessel. Since the average temperature of the vessel is below zero, it follows that it is slightly smaller than it would be if it were at a uniform temperature of zero. Thus the surface on which the first layer of ice forms will tend to enlarge when it assumes the zero temperature. After the first layer of ice is formed, its average temperature will also fall below zero, since the heat is conducted through the ice as well as through the walls of the vessel; and so the next layer of ice is also formed on a surface which will expand on reaching a uniform temperature of zero. And the same reasoning will apply to the formation of each layer, till the process of freezing is completed. So, when the apparatus is finally transferred to a bath of ice and water, the outer layers of the formation, including the walls of the vessel, will tend to expand, while the inner layers, being very near the freezing point, will tend to retain their dimensions. The effect of these stresses will be an increase in volume, and a corresponding decrease in density.

In the case of the second formation where the water freezes around the outside of the vessel, the same reasoning will apply, the ice always forming on a surface which will tend to assume larger dimensions when its temperature is brought to zero. However, in this case, the contracted support for the newly forming ice is on the inside (see fig. 2), and so when the ice mantle is complete and the instrument placed in a zero bath, it is the interior layers, including the walls of the vessel, which tend to expand, this expansion being resisted by the exterior layers. These forces cause a certain amount of compression of the volume, and so the density assumes a higher value.

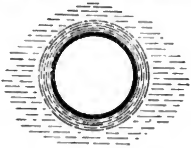


FIG. 2.

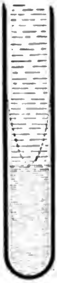


FIG. 3.

In the case of the column formation, represented diagrammatically in fig. 3, the explanation is somewhat more complex, as the difference in the coefficients of expansion of the ice and of the material of which the tube is formed has to be taken into account.

Suppose that the tube is of glass, the coefficient of this material being many times smaller than that of ice. When the first layers of ice are formed, and the freezing mixture is moved up along the tube, both the ice and that part of the tube containing the ice become colder, and contract; the ice, however, contracting much more than the glass. Thus the ice tends to occupy a smaller fraction of the space inside the tube than it would do at zero. This tendency is resisted by the rigidity of the mass of ice and its adhesion to the walls of the tube, the forces due to the contraction having a shearing effect at the juncture of the ice and glass. While the ice is in this contracted state with reference to the glass vessel, fresh layers of ice are continually forming further up the tube, thus binding the ice which was previously formed, into its cramped position. This action will continue up the tube as long as fresh ice is forming. When this process is completed and the apparatus is placed in a zero bath, the ice which was first formed tends to expand, this expansion being resisted by the superimposed layers. These expansive stresses result in a force of compression, longitudinal to the tube, and so tend to increase the density of the ice.

It must be noted that the reasoning in the last case is based on the assumption that the end of the extending ice column is flat, or approximately so. Should this become concave, as shown by the dotted line in fig. 3, the action in the case of the interior formation would come in, and under favourable conditions might completely offset the effect due to the longitudinal strains in the ice column. The concavity of the top of the extending ice formation would be caused either by advancing the freezing mixture rapidly, or by using a tube of a material of high thermal conductivity.

Also, in this third formation, the effect due to the shortening of the column of ice will be directly proportional to the ratio of the coefficient of expansion of ice to that of the material of which the tube is formed. Hence, if the latter coefficient were greater than that of ice, the column will apparently undergo a longitudinal expansion during the process of ice formation further up the tube, and so the effect of the stresses when the apparatus is placed in a zero bath will be to cause the ice to expand and therefore assume a lower density.

As far as the quantitative aspect of the matter is concerned, little can be said, as these actions depend on so many conditions, such as diameter of vessels, thermal conductivities, coefficients of expansion of materials, etc. However, these effects should be much more marked where freezing mixtures of extremely low temperatures are used, than where these are of a mild character, such as salt and ice.

The question very naturally presents itself now as to whether there is any species of ice which one would expect from *a priori* reasoning to be free from internal strains, and thus to have a normal density.

In the case of the formation of a sheet of ice on a pond or river, the ice starts at the edges, gradually extending out until the formation joins in the centre and the water is completely covered; all the ice formed subsequently is in the form of layers on the under surface of this sheet of ice. Now, when the ice is extending from the shores, before the sheet of water is completely frozen over, the formation is continually becoming thicker, and hence, as the heat from the water is being conducted away through the ice, the temperature of the ice is falling, and its volume is becoming less, the contraction being a two dimensional one. When the extending sheet of ice has completely covered the water, the superficial dimensions of the sheet become permanently fixed, and so the ice cannot respond to any change in temperature by a corresponding change in superficial dimensions. As this ice sheet becomes thicker, its temperature falls, and it contracts, but only in a direction at right angles to the plane of formation. A little consideration will show that the contraction or expansion in this direction, provided it be practically uniform over the whole sheet, cannot set up strains between the different layers of ice; and so the layers which are formed after the superficial dimensions of the ice sheet are fixed, should possess a normal density; and also the previously formed layers, when a uniform temperature of zero is attained throughout the mass, should be under a strain of compression acting in the plane of formation, and so should show a high density.

As far as icicles are concerned, nothing very definite can be said. If the formation were always kept completely wet by the dripping water, then the icicle should possess a normal density; but if the forming mass were only partially wet, or only wet on one side, then its average temperature would fall below zero, and the newly forming ice would grow upon a contracted support, which it would tend to compress when a uniform temperature was established, and hence the density would rise above the normal value. As a general rule, icicles are not kept completely wet during formation.

When dust-free water is cooled below zero and then agitated, exceedingly fine and translucent mixture. It seems highly probable that ice so formed should possess a normal density, as the formation is so finely distributed that the presence of any internal strains seems inconceivable.

The ideal ice, so far as normal density is concerned, would be the ground or anchor ice, formed along the beds of small streams during cold, clear nights, when the surface has not frozen over. In this formation, the heat escapes by radiation from the bottom and the ice always remains at the freezing temperature, and so cannot undergo any strains due to unequal expansion and contraction.

It seems very probable that ice recovers in time from any internal strains set up during formation, and for this reason, in cases where the density alters with time, it is likely that the true normal value is being gradually approached. The theory of the viscosity of materials would lead one to anticipate this change in the presence of internal strains.

The following facts, taken from the observations of various experimenters, seem to the writer to have a direct bearing on this explanation of the variation in the density of ice.

The interior formation was used both by Plücker and Geissler, and by Kopp. The result of three determinations made by the former experimenters gave the value 0·91580 ± ·000008, while Kopp obtained 0·9078 ± ·0007. Kopp's value, however, is unreliable, as his dilatometer was of very inferior construction, and the results were further vitiated by the presence of an air bubble in every specimen of ice experimented with.

The only experimenter who has used the second formation —viz., ice-mantles,—in his determinations, is Professor Nichols. In his paper he gives several abnormally high results, which are, however, unimportant as far as the absolute value is concerned, as they were obtained by using dilatometers containing large quantities of mercury, which caused a considerable deformation in the walls of the vessel. But there are several points in the account of his experiments which seem to have a decided bearing on the subject in question. He says that certain preliminary experiments made by him "appear to indicate that mantles formed by the use of alcohol as a refrigerant at —5° to —10° are less dense than those frozen by ether and CO_2 at —70° by at least one part in a thousand. It was likewise found that one of the latter mantles upon standing twenty-four hours in an ice bath, appeared to have lost density by nearly the same amount." This is precisely what one would be led to expect, as the amount of the internal strains depends on the temperature gradient of the ice at the time of formation of the different layers; and also the ice would tend to recover from these strains very quickly when kept at 0° C., as its elasticity is a minimum at this temperature. Professor Nichols also observes that it was impossible to obtain ice-mantles of more than a certain thickness, as the formation invariably became filled with a network of fine cracks when the mantle became very large. The most probable explanation of this phenomenon would seem to be that when the glass support and the inner layers have practically reached the temperature of the refrigerant, the outer layers are still at a temperature very near the freezing point. Hence, as the freezing progresses, the outer layers tend to contract far more than the inner ones; this contraction is free to take place in a radial direction, but the circumferential dimensions of the outer layers are fixed when the supporting layers have reached the limit of contraction. Therefore a decrease in temperature of these superimposed layers should result in the formation of small cracks, the general plane of these cracks being in the direction of the length of the tube and extending radially outwards. With regard to Professor Nichols' determinations on ice-mantles by the method of weighing, it seems highly improbable that these mantles were preserved intact during the experiments, and, if so, the results can have no bearing on this discussion, since a breaking up of the ice-mantle would at once release it from the effect of any internal strains.

Two determinations were also made by Nichols on the density of very fine specimens of the icicle formation, the result obtained, using the method of weighing, being 0·91807 ± ·00004.

Both Brunner and Nichols have determined the density of ice taken from the surface of ponds, formed at the beginning of very cold weather, and these two determinations show a remarkable agreement. Nichols also experimented with pond ice one year old, obtaining a value considerably lower than that of the newly cut specimens.

Bunsen, using an overflow dilatometer and experimenting on the column formation, obtained 0·91685 ± ·00003.

As the result of seven determinations of the density of the St. Lawrence ice, made by Professor H. T. Barnes and the author, the value 0·91661 ± ·000065 was obtained. The ice used in these measurements was cut from the lower surface of the ice sheet, and the specimens ranged from a month to over two years in age. No trace of any variation due to age was detected. A modification of the method of weighing was used.

These results are all given in tabulated form below. In the sixth column will be found the probable result, whether high or low, according to the theory given in this paper, and in the seventh column the difference from the density of old river ice is given, the value assumed being a mean between Nichols value and our own, weights being assigned in the ratio of 2 to 1 in favour of our own seven measurements, as compared with his one.

Exp'ter.	Method.	Kind of Ice.	Sp. Gr. at 0° C.	Prob. Error.	Calcul.	Obs.
Brunner	Double weigh.	Fresh surface ice	0·9180	± ·000039	High	+ ·0015
Plücker and Geissler	Dilatometer	Interior Form	0·91580	± ·000008	Low	— ·0007
Kopp	"	"	0·9078	± ·0007	Low	— ·0087
Bunsen	"	Column	0·91685	± ·000035	High	+ ·00035
Nichols	Double weigh.	Mantles	0·9163	± ·00009	High	— ·0002
"	"	Icicles	0·91807	± ·00004	High	+ ·0015
"	"	Surface (fresh)	0·91804	....	High	+ ·0015

The results may in the main be said to agree very well with the theory advanced, but, although some of the observed phenomena seem strikingly indicative of the truth of this explanation, it can hardly be said at present to be more than a suggestion. It is the writer's intention to pursue the matter experimentally as soon as possible; some preliminary measurements would seem to indicate that artificial ice of the interior formation tends to gain in density when allowed to stand in an ice bath, but the experiments were too rough to be conclusive.

Ice may undergo compression arising from other causes than unequal expansion and contraction, as when specimens are kept by being buried deep in ice houses, or are formed under a head of mercury in dilatometers. Thus, ground ice, which can undergo no strains due to unequal temperature, is always formed under a considerable hydrostatic pressure. However, the writer has purposely only treated the one aspect of the matter in this paper.

With regard to the Bunsen Ice Calorimeter, the conditions which affect the density of the mantle would seem to be its thickness, the diameter of the tube around which it is formed, the thermal conductivity of the same, and the temperature of the refrigerant; also the outer layers are probably less dense than the inner ones. This instrument would thus appear to have many disadvantages when used to obtain absolute calorimetric measurements. However, if the ice mantles are formed by the use of a comparatively mild refrigerant, and allowed to stand before being used, much greater accuracy should be attainable.

In conclusion, I wish to thank Professor Barnes for his kind supervision and suggestions in the preparation of this paper.

XVI.—*The Fall of Potential Method as applied to the Measurement of the Resistance of an Electrolyte in Motion.*

By H. T. BARNES, M.A.Sc., D.Sc.
Assistant Professor of Physics, McGill University, Montreal,

AND

J. GUY W. JOHNSON, B.A.
McGill University, Montreal.

(Communicated by Professor John Cox, M.A., F.R.S.C., and read May 27, 1902.)

In a note which one of the authors had the honour to send to the Royal Society of Canada, in 1900, it was pointed out that the change in density with concentration for many hydrated electrolytes is discontinuous. It was also suggested that this discontinuity represented a change in dissociation of the hydrate. Recently the authors have carried out some experiments on the change in resistance of a hydrated electrolyte with density, in order to study the effect, if any, of the discontinuity. If the effect is due to a change in dissociation the conductivity of the solution should be indicative of it.

The salt which we selected for the measurement was $MgCl_2$—one which exhibits well the change in question. This was obtained pure from Merck, and various solutions made in strengths above and below the concentration at which the change occurs.

Since the effect we were looking for is small and had been entirely overlooked in the work of other observers we were obliged to select a method for measuring the electrical resistance which would give us the greatest possible accuracy and delicacy. We selected a modification of the fall of potential method rather than the standard telephone method of Kohlrausch, because we found we could obtain much greater accuracy with the instruments at our disposal. We might state at the outset that it was the possession of such an instrument as the Thomson-Varley slide potentiometer with the corresponding high resistance (100,000 Ohms) galvanometer of the Thomson reflecting type, designed for use with it, which made our work possible by this method. There can be no question that the application of such instruments to the measurements rendered the results more accurate than could have been obtained by a telephone method.

As the effect of temperature on the resistance of an electrolyte is large, it was necessary for us to take special precautions to guard against this error. We, therefore, arranged to have the electrolyte flow slowly through the resistance cell, first passing through a spiral of glass tubing immersed in the water bath containing the cell. Thus it assumed the uniform temperature of the cell before entering, and any possible error due to current heating was reduced to a minimum. It has been shown by Hall that the motion of an electrolyte produces no change in its electrical resistance, although the results of Bosi[1] indicated such a change. Hall[2] repeated carefully Bosi's experiments, but with negative results. In several of our experiments we varied the velocity of flow, but could detect no difference.

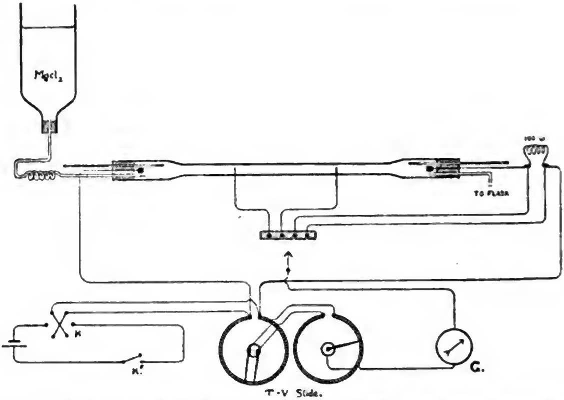


FIG. 1.—THE FALL OF POTENTIAL METHOD FOR MEASURING THE RESISTANCE OF AN ELECTROLYTE.

In fig. 1 we give a diagram of our cell as well as a sketch of the general electrical connections. The cell consisted of a narrow tube 14 millimetres in diameter and 15 centimetres long, fused to tubes of 3 cm. in diameter. Rubber stoppers closed the two ends. Through these rubber stoppers heavy platinum wires were passed, connecting with plates of platinized platinum foil. Potential terminals of platinum wire were fused into the glass of the small bore tube. The electrolyte entered the cell from a reservoir after passing through the glass spiral. A flask at the outflow end collected the solution which dripped from a tube inserted in the rubber stopper. Thermometers were placed in the inflow and outflow ends, and the temperatures read simultaneously during the measurements. The complete cell was immersed in a bath through which water was made to flow from the mains and the temperature carefully observed. The temperature was maintained constant during a set of readings, but it varied somewhat for the different measurements on account of the fact that the water in the mains became warmer as the summer weather advanced. In correcting the results to a uniform temperature a temperature coefficient was obtained from a special set of readings. This value was found to agree with the coefficient given in Kohlrausch and Holborn. It is our intention in conducting any further experiments to pay particular attention to keeping the temperature of our bath constant during a series of measurements with different concentrations. The electric current was supplied from a storage cell and was passed through a standard 100-ohm coil connected in series with the cell. The Thomson-Varley slide potentiometer was connected in parallel with the cell and standard coil, and being of such high resistance, 100,000 ohms, only shunted a small portion of the current. To avoid the errors due to polarization we arranged a make and break key in the main circuit shown at K^1 and a reversing key shown at K. The galvanometer was permanently connected to the sliding contact on the potentiometer, and to a contact which could be passed successively to the mercury cups *d, e, b, a*; these connected with the two potential terminals on the cell and the ends of the 100-ohm resistance coil. Since the fall of potential through the cell and standard, when the current was flowing, was equal to that on the potentiometer, equipotential points could be found between *d, e, b,* or *a* successively and the potentiometer. The fall of potential from *d* to *e* was then represented by the difference in the two readings on the potentiometer, and the fall of potential from *b* to *a* was likewise represented by two corresponding readings. As long as the current remained constant the resistance of the electrolyte represented by a column of liquid between two planes at right angles to the axis of the tube and fixed by the position of the potential terminals was given by the simple expression.

---

[1] Nuovo Cimento, 5, 249 (1897).

[2] Physical Review 7, 246 (1898).

$$R = \frac{d_1 - d_2}{d_3 - d_4} \times 100$$

In taking the readings, instead of allowing the current to flow and taking the position of the balance or zero current through the galvanometer by making and breaking the galvanometer circuit, the main current was made momentarily, and the deflection of the galvanometer observed before the cell had time to polarize. A second reading was then observed by reversing the main current at the reversing key. On account of rapid polarization the galvanometer would always show a deflection, but in case the balance was such that the deflection was in the opposite direction to that produced by the polarization, a deflection first in one direction and then in the other direction resulted. The balance point was taken to be the exact point at which the momentary deflection in the opposite direction to the polarization disappeared. After a little practice it was possible to take readings and repeat measurements of the resistance to 1 part in 5,000 with comparative ease.

As a check of the accuracy of our measurements the resistance of one of our solutions, through the kindness of Mr. McIntosh, was determined by the Kohlrausch method, using the telephone instrument set up and in constant use by him in the McDonald Chemistry Building. The result was in good agreement with our own on the calculation of the specific resistance, and showed, we think, that we were free from constant errors. Our method of;

a. Keeping the electrolyte in motion,
b. Reversing the direction of the main current between each reading,
c. Closing the main current for only a small fraction of time in obtaining the readings,

reduced the errors of the direct current method to a negligible amount and avoided current heating common to all methods.

In preparing our solutions we took great care to use pure distilled water, and to have all parts of the apparatus clean. Twelve different concentrations were taken varying above and below the point in question. These solutions were first adjusted roughly with a hydrometer and afterwards the density obtained accurately by means of a pyknometer. The density varied from 1·155 to 1·019, representing a range in strength from 0·211 grms. per c.c. to 0·026 grams per c.c.

The following table contains the results of our measurements:

DENSITY.	RESISTANCE.	CONCENTRATION GRAMS PER C.C.
1·1553	101·52	0·2119
1·1235	113·57	0·1670
1·1111	118·21	0·1470
1·1031	120·44	0·1350
1·0901	126·54	0·1200
1·0821	134·65	0·1085
1·0735	145·56	0·0970
1·0673	155·28	0·0888
1·0585	175·72	0·0770
1·0407	233·88	0·0536
1·0322	269·25	0·0424
1·0195	423·88	0·0260

These are plotted in fig. 2.

On the same diagram we represent the relation between the density and concentration. We use the same vertical scale for density, *i.e.*, from 1·00 to 1·30. The horizontal scale for the resistance-density curve is represented in ohms, each block representing 100 ohms. The horizontal scale for the other curve, given at the top of the page, represents the difference between a theoretical density, calculated on the assumption that every molecule of salt added to the solution displaces one molecule of water, and the true density as observed with the pyknometer. Thus, if the theoretical density held,

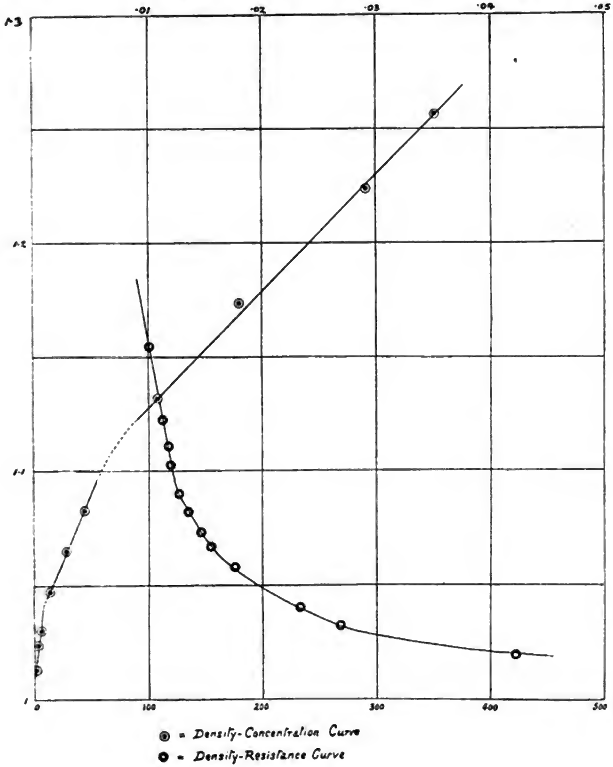


FIG. 2.

the curve would lie along the vertical axis. It does this approximately up to a concentration of ·05 grms per c.c., after which more water is displaced by the added salt than is represented by this simple relation.

A second change in relation appears to take place at a density of about 1·105. These points correspond approximately with the change in slope of the resistance curve.

Density at which a possible change in dissociation takes place:

Density-concentration.	Density-resistance.
1·105	1·090
1·040	1·035

In conclusion we may state that we hope to examine a number of other salts during the coming summer.

(Added January 1st, 1903.) We have examined the resistance curves of two salts, KCl and K_2 SO_4, since the communication of this paper, and find that the experimental evidence is not sufficiently strong to justify us in assuming a form of dissociation to account for the discontinuity in the density curves. There appears to be indications of it in the case of $MgCl_2$, *supra*, but this is not shown in our curve for K_2SO_4, where a very marked change in the density curve occurs. Our later experiments will shortly form the subject of a further communication.

XVII.—*On the Absolute Value of the Mechanical Equivalent of Heat.*

By H. T. BARNES, M.A.Sc., D.Sc.

Assistant Professor of Physics, McGill University, Montreal.

(Communicated by Professor John Cox, M.A.)

In the very careful and elaborate reports submitted to the Paris Congress in 1900, on the Mechanical Equivalent of Heat and the Specific Heat of Water, by J. S. Ames and E. H. Griffiths, a general summary of the work of previous observers was made. An examination of this summary shows what a wide divergence exists in the absolute value of this important constant.

This has already been pointed out by the author,[1] who has also shown that the results of Rowland and of Reynolds and Moorby, which are the best direct mechanical measurements we have, can be compared, and that they are in good accord with each other.

The author desires at this time to give what he considers to be the most probable value of the mechanical equivalent.

In selecting a value of the thermal unit to which to refer the mechanical equivalent of heat we have the one recommended by Griffiths in his report. This defines the unit as the heat required to raise the temperature of one gramme of water from 15° C to 16° C. We have also the one recommended by the author in his paper on the Specific Heat of Water, which defines the limit between 15·5° and 16·5° C. giving a mean temperature of 16° C. Since the specific heat decreases with rise in temperature these units differ a little, but their mean is almost exactly equal to the mean value over the entire range of temperature between the freezing and boiling points. It was this important fact which originally decided the author to recommend the unit at 16° C. Some time ago, before the variation curve for the specific heat of water was accurately known over the entire range, Griffiths was led to believe from certain of his measurements that the mean value of the specific heat between 0° C. and 100° C. was not far from the value at 15° C.

The absolute value of the specific heat at this temperature which was recommended by Griffiths in his report is $4{\cdot}187 \times 10^7$ ergs. This value in terms of the 16° C. unit becomes $4{\cdot}186 \times 10^7$ ergs. Rowland's value for this temperature, corrected by Waidner and Mallory,[2] comes $4{\cdot}186 \times 10^7$, which is the value given by Griffiths.

---

[1] Proc. Roy. Soc., 67, 238 (1900). Phil. Trans., A., Vol. 199 (1902).

[2] Physical Review, 8, 193, (1899).

The value of the mean specific heat obtained by Reynolds and Moorby is 4·1832. The value obtained by the author, using the continuous-flow method of electric calorimetry is 4·1883, in terms of the Clark cell value 1·4342 volts, or 4·1891 in terms of Griffiths unit. These values in terms of the Clark cell value 1·43325, which is equal to the absolute value obtained by Carhart,[1] are 4·1828 and 4.1836.

Since Reynolds and Moorby's absolute value, measured mechanically, is between these and equal to Rowland's value at the same temperature to within 1 in 1000, which was the limit of accuracy of Rowland's work, the evidence seems to point to a value of J equal to

$$4{\cdot}1832 \times 10^7 \text{ ergs.}$$

as being correct.

In gavitation units this becomes

$$426{\cdot}60 \text{ kilogrammetres.}$$

for latitude 45 and sea level taking Helmert's value of g equal to 980·5966,[2] or,

$$777{\cdot}58 \text{ foot-pounds.}$$

in the English units.

---

[1] Physical Review. 9, 288 (1899).

[2] Landolt and Bornstein's Tables.

XVIII.—*On the Density of Ice.*

By H. T. BARNES, M.A.Sc., D.Sc.,

Assistant Professor of Physics, McGill University, Montreal.

AND

H. LESTER COOKE, B.A.,

Demonstrator of Physics, McGill University, Montreal.

(Communicated by Professor John Cox, M.A.)

(Read May 27, 1902.)

The earliest determination of the density of ice was made by Robert Boyle, and the method employed was to observe the difference in volume of a certain quantity of water contained in a calibrated receptacle, first in the liquid and then in the solid state, and from this to calculate the density of the ice. The vessel used was a glass one, with a long narrow neck on which the graduations were marked. This was filled with water exhausted under an air pump and so comparatively free from air. A freezing mixture was then applied to the vessel from below, moving the mixture up as congelation took place, which by this method did not involve the fracture of the glass. In this way the volume of the water when frozen was observed to increase 11·12 per cent, which gives the value for the density of ice as 0·903. No great scientific value was aimed at here, the strains undergone by the glass during the formation of the ice rendering the results most uncertain, apart from the probable presence of minute cracks in the ice formation, a difficulty exceedingly hard to guard against in determinations involving the use of artificial ice. There were several other early determinations made by Williams, Heinrich, Dumas, Osann and others, and results obtained at various values ranging from 0·905 to 0·950. These, however, do not call for any special attention, as they were for the most part derived from investigations carried on in a comparatively rough way, and often involving corrections of such a nature as to render the results quite useless, from a scientific point of view.

During the last century there were many accurate determinations of the density of ice.

The first of these was performed by the German physicist Brunner. His method consisted of weighing ice in different media, whose densities could be accurately determined.

For this purpose he prepared pieces of river ice, formed during very sudden and severe cold weather. This ice he found could be procured in sizes suitable for his experiments, without flaw or crack of any description. He devoted some time and attention to the production of artificial ice free from air, but was not successful in obtaining any sufficiently free from the flaws and cracks which usually characterize this kind of ice.

The weighing was first conducted in air, corrections being made for air displacement. Then the specimen, which was suspended from the arm of the balance by a single human hair, was immersed in refined petroleum oil. The specific gravity of this oil was determined with the utmost accuracy, the method employed being that of weighing in air and in the petroleum a piece of glass, of which the coefficient of expansion had been determined very carefully. The loss of weight undergone by the specimen of ice when immersed in this liquid afforded the data for the computation of its density, which was found to be 0·9180 ± ·000039.

It is worthy of note here that this series of experiments, while involving the determination of the ice density, was not undertaken for this especial purpose, but rather for the refutation of a statement that the density decreased with a decrease of temperature. This, needless to say, was entirely disproved, the linear coefficient of expansion obtained being 0·0000375. (Experiments carried on from —1° to —20° C.)

After Brunner, the next experimenters of note to undertake determinations of this quantity were Plücker and Geissler. The principle employed by them was essentially that of Robert Boyle, to whose experiments reference has been made, the method, of course, being subjected to refinements not attempted in the earlier experiments.

The instrument employed was a dilatometer of exceedingly delicate construction, shown in fig. 2. First, the instrument was completely filled with mercury, after which water was introduced through the small opening at C; when the inner bulb B had been almost completely filled with water, the inlet C was sealed off in a flame.

The introduction of the water into the instrument forced the mercury up into the capillary tube A, which had previously been very carefully calibrated. The instrument was now ready for use, and was placed in a bath at 0° C. and the height to the mercury thread noted; then the apparatus was transferred to a freezing mixture, composed of alcohol, cooled by ice and calcium chloride. As one would expect, the walls of the instrument gave way under the strain when congelation took place ; however, the mercury was forced up in the capillary tube A, and the movement was a direct measure of the expansion of the water on freezing. Only three determinations of this kind were made, probably owing to the fact that a new instrument had to be prepared for each experiment.

The mean value obtained by these three determinations was 0·91580 ± 0·000008.

The determination made by Kopp in 1855 is scarcely worthy of mention. His method involved the use of a dilatometer, but one of poor design and involving probable errors of such a nature as to render his results quite worthless. His values came much lower than those of the preceding observers, a result which might have been anticipated from the fact that in every specimen of ice experimented on, obtained, of course, by artificial freezing, a small bubble was noticed. The value obtained was 0·9078 ± ·0007.

In 1860 Dufour undertook a new determination of the density of ice. His method differed from both the preceding ones, being incapable of the same degree of accuracy obtained by the double weighing, or by the dilatometric method.

The method consisted of submerging ice in a liquid, of which the density could be varied; then, by adjusting this, a point could be reached where the density of the liquid was identical with that of the ice, this being ascertained by observing when the ice was in equilibrium in the liquid. The specific gravity of the liquid was then accurately determined, and the ice density thus arrived at. In his first series of experiments, a solution of alcohol and water was used. Here, however, the results were doubly indirect, as the alcohol attacked the ice, when the mixture was at 0° C., rendering it necessary to carry on the experiments at lower temperatures than this, and then allow for the cubical expansion of the ice, adopting the coefficient obtained by Plücker in his experiments, viz., 0·000158. From 22 experiments he obtained the value 0·9175 ± 0·0007, the probable error here being the same as that of Kopp's results.

The year following the publication of these results, Dufour again set himself to solve the same problem, using the same method, but employing a mixture of chloroform and petroleum, neither of which attacks ice. Here again he worked at temperatures below the freezing point, the results obtained being slightly higher than those of the first set of experiments — 0·9178 ± 0·0005.

We now come to the work of Bunsen, who began his determinations in 1870. The method employed involved the use of a dilatometer of special design, the increase in volume being measured by the quantity of mercury expelled from a capillary point in the apparatus, the general principle being identical with that of the weight thermometer, without, of course, involving the coefficient of expansion for the glass dilatometer, as the observations before and after were both taken at zero Centigrade. Three determinations were made, the results showing a remarkable agreement, the mean value being 0·91685 ± ·00003.

This value, determined by three observations alone, has been the accepted value of the density of ice since 1870. This quantity, however, is of great importance, especially in connection with the use of the Bunsen ice calorimeter, and this fact led to a redetermination of this value in 1899 by Nichols.

Professor Nichols' first determinations were made by the dilatometer method, using a specially prepared instrument, resembling a combination of both a specific gravity bottle and a Bunsen ice calorimeter (see fig. 4). The principle employed in freezing the water was identical with that of the Bunsen calorimeter, and the method of observing the increase in volume of the water was the same as that used by Bunsen in his density of ice determinations, the density being arrived at by two different methods of calculation from the different weighings, both results, however, being obtained from the identical experiments. These two values, 0·92154 and 0·91631, are far from showing good agreement, this fact being especially pointed out by Nichols and used as an argument against the dilatometer method, when mercury is used to fill the instrument. The great divergence shown by these two results is probably due in a large measure to the deformation of the walls of the instrument, caused by filling the dilatometer completely and afterwards partially with mercury.

These considerations led Professor Nichols to abandon this method and to devise another, in which the results would be more certain and consistent. The next method tried was that of weighing, first in air, and then in refined petroleum. Great precautions were taken in the details of the experiments, the density of the petroleum being found by weighing a piece of glass in distilled water, and then in the petroleum, the coefficient of expansion of the materials being allowed for. All the weighings were likewise reduced to weights "in vacuo."

The main object of this series of experiments was to determine the variation in density, if such existed, of specimens of ice formed under different conditions and obtained from different sources. Four varieties of ice were thus experimented on, and results obtained ranging from 0·91816 to 0·91590; these being given in the following table:—

TABLE I. RESULTS OF NICHOLS ON THE DENSITY OF ICE.

Kind of Ice	Temperature of weighings	Density at 0 in terms of that of water at 0	Means
Ice-mantles	− 1·6	0·91619	
(CO_2) and ether	− 1·5	0·91590	0·91615
	− 0·6	0·91636	
Natural Ice (icicles)	− 1·9	0·91816	
	− 1·6	0·91801	0·91807
Natural Ice (pond ice newly cut)	− 0·7	0·91804	0·91804
Natural Ice (pond ice one year old)	− 1·8	0·91644	0·91644

Nichols then proceeded to compare the results obtained with the values given by the other observers for similar specimens of ice and showed that there is a remarkably good agreement and one that evidently points to real differences in the densities of the specimens, and not errors in the methods.

The importance of these considerations led Nichols to devise another and independent method by which these results could be checked and verified. The plan decided on was as follows:—A small iron box was constructed, built up of slabs of iron with the faces planed and polished, with an accurately fitting slab of iron as a cover. After having brought the box to the temperature of the room, it was filled with mercury, and from the weight of the mercury required to completely fill the box, its cubical contents was found. The volume was computed for zero, by allowing for the cubical expansion of the iron and mercury. The box thus having been measured, a piece of ice, newly cut from a reservoir, was placed in the box, the ice being of such a size as to have a small margin all around it, when in position in the box (the interstices being filled with mercury), the lid, which was formed of a planed slab of iron fitting accurately on to the planed tops of the four sides of the vessel, was then pressed down, forcing out part of the mercury and leaving in the box only mercury and ice. From the weight of the ice, determined beforehand, and the cubic contents of the box, and the amount of Hg. necessary to fill up the space around the ice in the box, the density of the ice could be computed. The value obtained was 0·91772.

Nichols concludes his paper by pointing out the strong evidence which his experiments bring to support the theory that there is an actual discrepancy between the absolute values of the density of specimens of ice formed under different conditions, the artificial ice experimented upon being formed similarly to the ice mantles formed in the Bunsen Ice Calorimeter.

In reviewing these experiments, it will at once be seen that there are three general methods of determining ice density, viz., equilibrium, dilatometric and weighing methods.

In the first method, obviously, great accuracy cannot be obtained. Of the two experimenters using this method, Dufour obtained by far the most accurate results. The advantages of the method are that both artificial and natural ice can be experimented upon, and the determinations can be repeated upon the same specimen as often as desired. However, these advantages are far outweighed by the above mentioned disadvantages, and the method as used by Thomson and Dufour may be set aside as insufficiently accurate.

The next general method to be considered is the dilatometric. The construction of the dilatometer for use in these determinations is very varied; but it will be sufficient to study the forms used by Kopp, Plücker and Geissler, and by Bunsen.

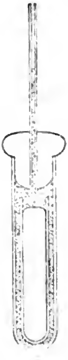


FIG. 1. Kopp's Dilatometer

The instrument used by Kopp (see fig. 1) had many disadvantages, which need not be entered into here at great length.

Whenever the water in the inner tube was frozen, a small bubble was always observed in the ice, which would, of course, tend to increase the observed volume and alter the density. The liquid used to fill the vessel was turpentine oil. The oil would tend to penetrate the cork, and the joints between the cork and the glass tubes, and so vitiate the results. When the ice formed, the oil was forced up higher in the capillary tube and thus the interior pressure on the walls of the vessel was increased and its dimensions altered. The order of accuracy of the instrument is shown by the fact that, while only two sets of readings were taken, these varied 2 parts in 900, and as these were only read to 1 part in 1100, Kopp himself evidently realized the limitations of the instrument. The results obtained were far below those of the other experimenters.

The apparatus employed in Plücker and Geissler's determinations was far more delicate and accurate. There was no cork to add uncertainty to the action of the instrument. Also the difficulty of the different internal pressure, owing to the column of mercury being forced up in the tube, was partially overcome by having the capillary tube widened from *a* to *b*, causing the difference of head to be less than it otherwise would have been. But this advantage is offset by the use of mercury as the liquid, owing to the great specific gravity of this metal. The most serious objection to the instrument, however, is the fact that the walls of the inner chamber give way under the strain and thus form crevices.

We now come to Bunsen's dilatometer, the construction of which is shown in the accompanying diagram. A number of the defects of the dilatometers previously constructed were overcome in this instrument. The varying internal pressure, caused by the alteration of the level of mercury in a capillary tube, was obviated by arranging the instrument so that the mercury would be forced out into a beaker, which could be afterwards weighed, thus maintaining the internal pressure on the instrument constant. Also the difficulty about fracturing the sides of the vessel during the formation of ice was eliminated by starting the ice formation at the end "*a*" of the instrument and gradually extending the solidification down to the juncture of the water and mercury at *b*. But, unfortunately, the uncertainty of the cork in Kopp's apparatus, which difficulty was avoided by Plücker and Geissler, was reintroduced into this instrument, and may be regarded as its weak point. The apparent disadvantage owing to the deformation of the walls of the instrument does not interfere with the accuracy of the instrument, as this deformation is the same before and after the formation of the ice.

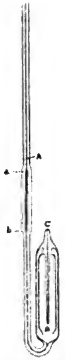


FIG. 2. Plücker and Geissler's Dilatometer

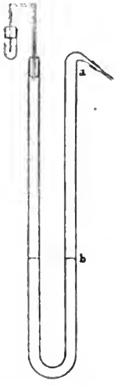


FIG. 3. Bunsen's Dilatometer

This instrument is undoubtedly the most accurate of all the dilatometers used in these determinations. But there is one possible disadvantage, which it shares with all dilatometers caused by the formation of the ice in the instrument itself.

The last general method to be considered is that of weighing. This is capable of several slight modifications, so that it would be well to consider the plans adopted by Brunner and Nichols separately.

Brunner's experiments were designed primarily with the object of ascertaining the coefficient of expansion of ice between 0° and —20° C. However, the measurements made supplied the necessary data for the computation of the density at zero. The plan is indirect, as no weighings were actually carried on at zero, for which temperature the ice density is required. The method is, in fact, doubly indirect, as the density of the ice is compared with that of the liquid used, the specific gravity of this liquid having to be determined by separate experiment, thus there is an extra process introduced, involving an additional liability to error. The liquid used was petroleum, which does not act on ice at temperatures below —1° C., this being the highest temperature at which any of the determinations were carried on.

Professor Nichols' results are open to precisely the same objections as Brunner's, being carried on at temperatures below the freezing point and involving a separate determination of the density of the liquid used.

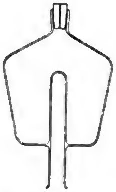


FIG. 4. NICHOLS' DILATOMETER.

We are now in a position to summarize the relative advantages and disadvantages of each of these three general methods.

The weak point of the first method, that of adjusting the density of the suspending liquid until the ice is in equilibrium, lies in the uncertainty of each separate experiment — the method is, in fact, not sensitive enough for the requirements of the determinations.

The dilatometric methods used by Kopp, Plücker and Geissler, and by Bunsen, each have some uncertain feature peculiar to the particular instrument used.

The objections to the method of weighing are that the experiments are not carried on at zero, and the density of the liquid has to be determined by a separate experiment. The application of the coefficient of expansion in order to reduce the density to zero is not a serious objection, though it may be possible that this coefficient, which was determined for temperatures ranging from —1° to —20° C., may not hold between say —1° and 0°, owing to 0° being the point where a change of state takes place; nor is the separate experiment for determining the specific gravity of the liquid a serious objection, as this is done by the same method as the ice density determinations, and is capable of the same degree of accuracy.

From this it will be seen, that it is the method of weighing from which one would expect the most accurate results, and, as a matter of fact, as Nichols has also pointed out, it is the only one that has yielded consistent results in each of its applications to the measurement of ice density, and it is evidently to this method that one must look for a final determination of the absolute value.

It was owing to a consideration of these facts, that the method of weighing was adopted in the following series of ice determinations carried out in the Macdonald Physics Building, during the winter of 1900-01, by the authors.

The objections to which former methods of weighing were open, that the ice during the experiments was not at the temperature for which the density was required, was eliminated by the arrangement employed in these determinations, the ice first being weighed in air at zero, and then in water at the same temperature; the water being unable to act upon the ice without the access of heat, which was prevented by the experimental arrangements.

The ice is placed in the weighted grip which is suspended from the arm of a sensitive balance by a fine wire. This wire passes through a long, narrow tubular opening in the cover of a copper vessel, which is surrounded by a mixture of pure snow and water and the entire contents thus brought to zero. After the ice has been weighed, pure water at zero temperature is admitted into the vessel, and after this has completely covered the suspended ice, the weight is again taken, and from the loss due to immersion, the density of the ice is calculated, due corrections being made for the weight of the suspension and grip and for the density of the water.

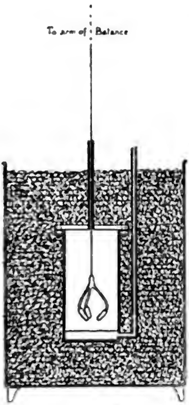


FIG. 5.

The general arrangement of the apparatus is shown in the accompanying diagram.

The grip was made of flexible brass wire, about a millimetre and a half in diameter, the three prongs and the end of suspending wire being very carefully soldered together. To the lower end of each prong a short piece of fine lead tubing was then soldered to counteract the tendency of the ice to rise to the surface when immersed in the water. The greatest care was taken in the soldering to prevent cracks or inequalities of the surface upon which bubbles of air might have lodged during immersion. The upper end of the wire ended in a hook, by which it could be attached to the arm of the balance.

The copper vessel inside which the grip was suspended was about 15 cms. in diameter and 40 cms. high. The top could be securely bolted down and was rendered water-tight by means of a leather washer. A brass tube, about 1½ cms. in diameter and 30 cms. long, was soldered in an upright position into a hole in the centre of this cover, forming a long, narrow neck through which the suspension wire could hang freely from the balance arm down into the interior of the vessel. This long neck also rendered it possible to completely immerse the vessel in the mixture of snow and water. In the lower part of the vessel an outlet was constructed of a bit of bent brass tubing soldered in position. To this orifice a very long piece of brass tubing was attached by means of a rubber neck, this tubing projecting above the snow and water, and preventing this mixture from entering at the lower opening. By pulling out this tubing the water could be allowed to enter the vessel and cover the suspended specimen of ice. In case the inflow of water should carry in small particles of snow, which would tend to vitiate the observations, a piece of fine wire gauze was fastened to the inside of the vessel, just above the inlet, which therefore cleared the water of all particles of snow before it reached the specimen of ice.

The outside vessel, which contained the snow and water mixture, was of copper and about 60 cms. in diameter by 70 cms. high. Thus when the inner vessel containing the specimen was imbedded in this mixture, it was surrounded by a wall of snow and water ranging in thickness from 15 to 20 cms., more than sufficient to prevent any possibility of transmission of heat from the outside.

The balance used was one constructed by Oertling, and very sensitive. A hole was bored in the bottom of the case and also through the supporting table to allow the free passage of the suspension to the rest of the apparatus, which was placed under the table during the weighings.

The following was the method of carrying out an experiment: A piece of ice was cut from the solid block a little larger than required. This was then reduced by washing in cold water, which removed all traces of chipping and crevices due to the cutting. It was then put aside and allowed to come to zero temperature, shown by its tendency to melt. Meanwhile, the mixture of snow and water was prepared, the inner vessel imbedded in it with the top off and the apparatus taken into the open air, the temperature during the days of the experiments never being far from 0° C. The specimen was then taken outside, carefully dried with filter paper and a linen rag, placed in the weighted grip, and placed inside the inner vessel, the specimen never being touched by the bare hand during these operations. The cover was then securely bolted on, the end of the suspension passing up through the tubular opening, and after having completely covered the main body of this inner vessel to a depth of about 10 to 15 cms., the whole apparatus was carried in to the laboratory and placed under the table on which the balance was placed. After passing the suspension up through the table and balance case, it was attached to the arm of the balance and the vessels beneath adjusted till it was hanging freely. Before taking the weight, the specimen was allowed to remain thus suspended for about 15 minutes so as to accurately assume the temperature of the surrounding mixture. After the weight had been carefully taken to ·1 of a milligram, the water was allowed to enter the inner vessel from the surrounding mixture and the weight again taken. The density of the ice is calculated from the loss of weight owing to the immersion in the water.

The weight and density of the suspension had to be allowed for in these calculations, and they were determined in the same manner as the ice density, the experiment being carefully repeated on the suspension and grip after each ice density experiment, and using the same water for immersion. The density of the water in the inner vessel was then compared with that of distilled water by means of a pyknometer. All the weighings were corrected to weight in vacuum.

One of the primary objects of these experiments was to determine the variation in the density of old and new ice in case any such difference existed, and with this end in view, the specimens experimented upon were cut from blocks of ice taken from the St. Lawrence River during the winters of '99, '00, and '01, and kindly supplied to us by Mr. Becket, from the warehouses of the City Ice Company. However, no systematic difference was noticed in these three kinds of ice, and it is safe to assume that for ice similar in formation to these (*i.e.*, formed on the lower surface of a thick field of ice completely covering the river), no such variation exists. Nichols' experiments, however, clearly showed that on the specimens used in his determinations age certainly acted in such a manner as to cause the density to continually approach the value which he assumes as the normal.

The following is a table of the results obtained by the method which has just been described:

TABLE II. ON THE DENSITY OF ICE. METHOD OF WEIGHING IN WATER AT 0° C.

Date	Year of Formation	Density	Difference from Mean
March 9th	1901	·91684	·00023
" "	1901	·91665	·00004
" "	1900	·91661	·00000
" 16th	1900	·91642	·00019
" "	1899	·91650	·00011
" "	1899	·91648	·00013
" 23rd	1900	·91678	·00017

Mean = ·916611 ± ·000065

In order to check the accuracy of the method, two determinations were made upon the same specimen (the 1899 ice), the ice being removed, washed, and the whole experiment repeated. The two results agree to 2 parts in 90,000. All the other determinations were made with different specimens, sizes ranging from 150 — 200 grams.

From these experiments it appears that the density of the St. Lawrence river ice may be taken as

0·91661 ± ·00007.

a value agreeing very closely to Nichols' value for old river ice, but considerably lower than his value for natural ice newly cut. It also agrees very closely with Bunsen's result (2 in 10,000), which is the generally accepted value.

Quite recently, experiments have been carried out by J. H. Vincent,[1] on the Density and Cubical Expansion of Ice. His method consisted in weighing water in mercury. The water was weighed both as liquid at 0° C., and as solid at several temperatures below the freezing point. It was necessary for him to assume values for the density of water and mercury at 0° C. The density of ice at 0° C. was then calculated, assuming that the densities of ice and mercury are linear functions of the temperature. The measurements are therefore not direct, but depend on certain pre-arranged assumptions.

The mean value of the density of ice at 0° C. is found by Vincent to be ·9160. The variations of the individual computations, which had to be made in order to arrive at a value of the density at 0° C., are of the order of 1 in 1,000.

---

[1] Proc. Roy. Soc., 69, 422 (1902).

From a careful study of the large amount of data available on the density of ice, it is evident that this is subject to real variations as Nichols suggested and partially showed in his work. These variations are, we believe, due to the manner of formation of the ice and are the result of strains set up in the ice during formation. That such strains disappear in time and that the ice approaches a limiting value seems probable. This has been already indicated in Nichols' work, who actually observed a change in density in an ice mantle which had been allowed to stand. Experiments are in progress in this laboratory to test this point, and it is hoped further results may be communicated later.

In our historical references we have made constant use of the valuable *resumé* of the subject contained in Nichols' paper.

BIBLIOGRAPHY.

Boyle's Works (Edition of 1772, Vol. II., p. 551.

Gehler, Physikalisches Worterbuch, Vol. III., p. 113.

Pinkerton's Voyages and Travels, Vol. I., p. 573.

Williams, Gothaisches Mag., Vol. VIII., p. 176.

Th. Thomson, A System of Chemistry (Edinburgh, 1802), Vol. II., p. 167.

Heinrich, Bayerisches Akad., Vol. II., p. 149 (1806), and Gilbert's Ann., Vol. XXVI., p. 228 (1807).

Berzelius, Lehrbuch der Chemie (Wöhler's translation, 1825), Vol. I., p. 364.

Dumas, Traité de Chemie, Vol. I., p. 19.

Dufour, Comptes Rendus, Vol. L., p. 1039.
    Bibliotheque Universelle, June (1860).
    Archives des Sciences, Vol. VIII., p. 89 (1860).
    Comptes Rendus, Vol. LIV., p. 1079.
    Archives des Sciences, Vol. XIV., p. 5 (1862).

Brunner, Pogg. Ann., Vol. LXIV., p. 113 (1845).

Plücker and Geissler, Pogg. Ann., Vol. LXXXVI., p. 265.

Kopp, Ann. der Chem., Vol. XCIII., p. 129 (1855).

Bunsen, Pogg. Ann., Vol. CXLI., p. 1 (1870).

Osann, Kastner's Archiv., Vol. XIX., p. 100.

Heinrich, Gilbert's Ann., Vol. 26, p. 228.

Forbes, Glacier Theory, Edin. Rev. (1842).

Petzholdt, Beiträge zur Geognosie von Tyrol (1843).

Achard, Chem.-Phys., Schriften (Berlin, 1780).

Mussenbrek, Essai de Phys., Vol. I., p. 144 (Leyden, 1739).

Struve, Pogg. Ann., Vol. LXVI., p. 298.

Marchand, Journ. f. prakt. Chemie, Vol. XXXV., p. 254.

Nichols, Phy. Rev., Vol. VIII., p. 21 (1899), and Vol. VIII., p. 184 (1899).

Barnes, Phys. Rev., Vol. XIII., p. 55 (1901).

Vincent, Proc. Roy. Soc., Vol. LXIX., p. 422 (1902).

XIX.—*On a Theorem regarding Determinants with Polynomial Elements*

By W. H. METZLER, B.A., Ph.D., F.R.S.E.

Professor of Mathematics, Syracuse University.

(Read May 27, 1902.)

1. In a paper[1] entitled "On the development of determinants which have polynomial elements," Dr. Muir gives the following three theorems: I, II, III.

Let $D_{n,p}$ be a determinant of the *nth* order, each of whose elements consists of p terms; let $\Sigma D_{n,p-1}$ denote the sum of the p determinants formed from $D_{n,p}$ by omitting, firstly, all the first terms of the elements, secondly, all the second terms, and so on; let $\Sigma D_{n,p-2}$ denote the sum of the $\frac{1}{2} p\ (p-1)$ determinants formed by omitting, firstly, all the first and all the second terms of the elements of $D_{n,p}$; secondly, all the first and all the third terms and so on, and let $\Sigma D_{n,p-3}$, $\Sigma D_{n,p-4}$, etc., bear similar interpretations, then

$$D_{n,p} - \Sigma D_{n,p-1} + \Sigma D_{n,p-2} \ldots . = o\ (p > n) \ldots\ldots \text{(I)}.$$

If $\Pi_{n,p}$ denote the product of n p-termed expressions; if $\Sigma \Pi_{n,p-1}$ denote the sum of the p products formed from $\Pi_{n,p}$ by omitting, firstly, all the first terms of the expressions; secondly, all the second terms, and so on; if $\Sigma \Pi_{n,p-2}$, $\Sigma \Pi_{n,p-3}$, etc., bear similar interpretations; then

$$\Pi_{n,p} - \Sigma \Pi_{n,p-1} + \Sigma \Pi_{n,p-2} \ldots . = o\ (p > n) \ldots .. \text{(II)}.$$

The third is

$$(a_1 + a_2 + \,.\,.\, + a_p)^n - \Sigma\, (a_1 + a_2 + \,.\,.\, + a_{p-1})^n + \Sigma\, (a_1 + a_2 \,.\, + a_{p-2})^n$$
$$\ldots . + (-1)^{p-1}\ \Sigma\, a_1^n \ldots . = o\ (p > n) \ldots\ldots .. \text{(III)}.$$

It will be seen that theorems II and III are particular cases of theorem I.

For values of $p \overset{=}{>} n$ the right-hand sides of these equations are no longer zero, and the principal object of this paper is to furnish their values under these conditions, *i.e.*, to obtain general theorems true for all values of p.

---

[1] Messenger of Mathematics, New Series, No. 153, 1884.

2. Let

$$D_{n,\,p} \text{ or } \Delta = \begin{vmatrix} a_{11} + b_{11} + \ldots + p_{11} \ldots \ldots a_{1n} + b_{1n} + \ldots + p_{1n} \\ a_{21} + b_{21} + \ldots + p_{21} \ldots \ldots a_{2n} + b_{2n} + \ldots + p_{2n} \\ \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \\ \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \\ a_{n1} + b_{n1} + \ldots + p_{n1} \ldots \ldots a_{nn} + b_{nn} + \ldots + p_{nn} \end{vmatrix}$$

let $A = |\, a_{1n} |$, $B = |\, b_{1n} |$, ... $P = |\, p_{1n} |$,
and let $\Delta\, a_\alpha\, b_\beta\, c_\gamma \ldots . p_\pi$ denote the determinant formed from Δ, as follows: The first α columns are taken from A, the next β columns are taken from B, the next γ columns are taken from C, and so on; the last π columns being taken from P, with the proviso that no two columns thus taken have the same column number, *i.e.*, come from corresponding positions, and where $\alpha + \beta + \gamma + \ldots . \pi = n$; then, as is well known,

$$\Delta = \overset{n}{\underset{o}{\Sigma}}\alpha\ \overset{n}{\underset{o}{\Sigma}}\beta \ldots . \overset{n}{\underset{o}{\Sigma}}\pi\ \Delta\, a_\alpha\, b_\beta \ldots . p_\pi \qquad \text{(A)}$$

The generalization of Muir's theorem I is as follows:

$$D_{n,\,p} - \Sigma\, D_{n,\,p-1} + \Sigma\, D_{n,\,p-2} \ldots\ldots + (-1)^{p-1} \Sigma\, D_{n,\,1}$$
$$= \Sigma\, \Delta\, a_{n-p+1-\alpha}\, b_{\alpha+1-\beta}\, c_{\beta+1-\gamma} \ldots . n_{\mu+1-\upsilon}\, p_{\upsilon+1} \qquad \text{(B)}$$

where $n - p \geqq \alpha \geqq \beta \geqq \gamma \geqq \ldots . \geqq \upsilon \geqq o$,
and where, since the subscripts of a, b . . . . p are by definition essentially positive, we are to interpret $\Delta\, a_\alpha\, b_\beta \ldots . p_\pi$ as zero in case of a negative subscript which occurs when $p > n$.

To prove this theorem we have but to partition all the determinants in (B) with polynomial elements into determinants with monomial elements according to (A), and then it may be seen that the complete coefficient of any one of these determinants with monomial elements is zero.

As illustrations we have for $p = 3$ and $n = 3$

$$\begin{vmatrix} a_{11} + b_{11} + c_{11} & a_{12} + b_{12} + c_{12} & a_{13} + b_{13} + c_{13} \\ a_{21} + b_{21} + c_{21} & a_{22} + b_{22} + c_{22} & a_{23} + b_{23} + c_{23} \\ a_{31} + b_{31} + c_{31} & a_{32} + b_{32} + c_{32} & a_{33} + b_{33} + c_{33} \end{vmatrix}$$

$$- \Sigma \begin{vmatrix} a_{11} + b_{11} & a_{12} + b_{12} & a_{13} + b_{13} \\ a_{21} + b_{21} & a_{22} + b_{22} & a_{23} + b_{23} \\ a_{31} + b_{31} & a_{32} + b_{32} & a_{33} + b_{33} \end{vmatrix}$$

$$+ \Sigma \begin{vmatrix} a_{11} & a_{12} & a_{13} \\ a_{21} & a_{22} & a_{23} \\ a_{31} & a_{32} & a_{33} \end{vmatrix} = \Sigma \begin{vmatrix} a_{11} & b_{12} & c_{13} \\ a_{21} & b_{22} & c_{23} \\ a_{31} & b_{32} & c_{33} \end{vmatrix}$$

for $p = 2$ and $n = 3$

$$\begin{vmatrix} a_{11}+b_{11} & a_{12}+b_{12} & a_{13}+b_{13} \\ a_{21}+b_{21} & a_{22}+b_{22} & a_{23}+b_{23} \\ a_{31}+b_{31} & a_{32}+b_{32} & a_{33}+b_{33} \end{vmatrix} - \begin{vmatrix} a_{11} & a_{12} & a_{13} \\ a_{21} & a_{22} & a_{23} \\ a_{31} & a_{32} & a_{33} \end{vmatrix} - \begin{vmatrix} b_{11} & b_{12} & b_{13} \\ b_{21} & b_{22} & b_{23} \\ b_{31} & b_{32} & b_{33} \end{vmatrix}$$

$$= \begin{vmatrix} a_{11} & a_{12} & b_{13} \\ a_{21} & a_{22} & b_{23} \\ a_{31} & a_{32} & b_{33} \end{vmatrix} + \begin{vmatrix} a_{11} & b_{12} & a_{13} \\ a_{21} & b_{22} & a_{23} \\ a_{31} & b_{32} & a_{33} \end{vmatrix} + \begin{vmatrix} b_{11} & a_{12} & a_{13} \\ b_{21} & a_{22} & a_{23} \\ b_{31} & a_{32} & a_{33} \end{vmatrix}$$

$$+ \begin{vmatrix} a_{11} & b_{12} & b_{13} \\ a_{21} & b_{22} & b_{23} \\ a_{31} & b_{32} & b_{33} \end{vmatrix} + \begin{vmatrix} b_{11} & a_{12} & b_{13} \\ b_{21} & a_{22} & b_{23} \\ b_{31} & a_{32} & b_{33} \end{vmatrix} + \begin{vmatrix} b_{11} & b_{12} & a_{13} \\ b_{21} & b_{22} & a_{23} \\ b_{31} & b_{32} & a_{33} \end{vmatrix}$$

3. If we make all the terms vanish in all the elements of Δ except those in the principal diagonal, it reduces to the product of n polynomials, and if $\Pi\, a_{\alpha}\, b_{\beta} \ldots p_{\pi}$ denote the product of α a's, β b's, γ c's . . . π p's, then theorem (B) becomes

$$\Pi_{n,\,p} - \Sigma\, \Pi_{n,\,p-1} + \ldots . + (-1)^{p-1} \Sigma\, \Pi_{n,\,1}$$
$$= \Sigma\, \Pi\, a_{n-p+1-\alpha}\, b_{\alpha+1-\beta} \ldots . p_{\upsilon+1} \tag{C}$$

When $p > n$ $\Pi\, a_{n-p+1-\alpha}\, b_{\alpha+1-\beta} \ldots . p_{\upsilon+1} = o$ and we have Muir's theorem II.

4. If further we make all the polynomials in $\Pi_{n,\,p}$ identical, there results the relation

$$(a_1 + a_2 + \ldots . + a_p)^n - \Sigma\, (a_1 + a_2 + \ldots . + a_{p-1})^n + \ldots$$
$$+ (-1)^{p-2} \Sigma\, (a_1 + a_2)^n + (-1)^{p-1} \Sigma\, a_1^n$$
$$= \Sigma\, a_1^{n-p+1-\alpha}\, a_2^{\alpha+1-\beta} \ldots . a_p^{\upsilon+1} \tag{D}$$

When $p > n$ the right-hand side vanishes and we have Muir's theorem III.

5. If $a_1 = a_2 = \ldots . = a_p = 1$ we have from (D)

$$p^n - p\,(p-1)^n + \frac{p\,(p-1)}{2\,!}\,(p-2)^n \ldots . (-1)^{p-2} \frac{p\,(p-1)}{2\,!}\, 2^n + (-1)^{p-1} p$$
$$= \Sigma \binom{n}{n-p+1-\alpha} \binom{p-1+\alpha}{\alpha+1-\beta} \binom{p-2+\beta}{\beta+1-\gamma} \ldots .. \binom{\upsilon+1}{\upsilon+1}$$
$$\text{or} = \Sigma\, \frac{n\,!}{(n-p+1-\alpha)\,!\,(\alpha+1-\beta)\,! \ldots . (\upsilon+1)\,!} \tag{E}$$

The value of this series on the left of (E) has been given in determinant form by Dr. E. D. Roe.[1]

---

[1] Annals of Mathematics, Vol. II., No. 6, p. 191.

6. If $p = n$, the right hand-side of (B) is

$$\Sigma \varDelta \, a_1 \, b_1 \, c_1 \ldots . \, p_1$$

the right-hand side of (C) is

$$\Sigma \varPi \, a_1 \, b_1 \ldots . \, p_1$$

and the right-hand side of (E) is

$$n\,!$$

If θ is an imaginary *nth* root of unity, and

$$\varPi_{n,n} = (a_1 + a_2\theta + a_3 \theta^2 \ldots + a_n \theta^{n-1}) (a_1 \theta + a_2\theta^2 \ldots + a_{n-1} \theta^{n-1} + a_n) \ldots . (a_1 \theta^{n-1} + a_2 + a_3 \theta + \ldots . + a_n \theta^{n-2})$$

then (C) takes the form

$$\begin{aligned}(a_1 + \theta a_2 + \ldots . + \theta^{n-1}a_n)^n - \Sigma (a_1 + \theta a_2 + \ldots . \theta^{n-2}a_{n-1})^n + \\ + (-1)^{n-2} \Sigma (a_1 + \theta a_2) + (-1)^{n-1} \Sigma a_1^n \\ = n\,! \, a_1 \, a_2 \, a_3 \ldots . \, a_n \qquad \text{(F)}\end{aligned}$$

If, in addition, $a_1 = a_2 = \ldots . = a_n = 1$; then (F) becomes

$$\begin{aligned}- \Sigma (1 + \theta + \theta^2 + \ldots \theta^{n-2})^n + \Sigma (1 + \theta + \ldots + \theta^{n-3})^n + \ldots \\ + (-1)^{n-2} \Sigma (1 + \theta) + (-1)^{n-2} n = n\,! \qquad \text{(G)}\end{aligned}$$

But since

$$\begin{aligned}\Sigma (1 + \theta + \theta_2 + . + \theta^{n-k})^n = \Sigma (-\theta^{n-k+1} - \theta^{n-k} \ldots + 2) - \theta^{n-1})^n \\ = \Sigma (-1)^n (1 + \theta + \theta^2 + \ldots \theta^{k-2})^n\end{aligned}$$

We have from (G)
for $n = 2\,s + 1$

$$\begin{aligned}(-1)^{s+1} 2 \Sigma (1 + \theta + \theta^2 + \ldots . + \theta^{s-1})^{2s+1} + (-1)^{s+2} 2 \Sigma \\ (1 + \theta + \ldots + \theta^{s-2})^{2s+1} + \ldots + (-1)^{2s-1} 2 \Sigma (1 + \theta)^{2s+1} \\ + (-1)^{2s} 2 (2\,s + 1) = (2\,s + 1)\,! \qquad \text{(G')}\end{aligned}$$

for $n = 2\,s$

$$\begin{aligned}(-1)^s \Sigma (1 + \theta + \theta_2 + \ldots + \theta^{s-1})^{2s} + (-1)^{s+1} 2 \Sigma (1 + \theta + \theta^{s-2})^{2s} \\ + (-1)^{2s-2} 2 \Sigma (1 + \theta)^{2s} + (-1)^{2s-1} 2.2\,s = (2\,s)\,! \qquad \text{(G'')}\end{aligned}$$

XX.—*On the Potential Difference required to produce Electric Discharge in Gases at low pressures—An Extension of Paschen's Law.*

By W. R. CARR, B.A.

(Communicated by President Loudon.)

(Read May 27, 1902.)

I. INTRODUCTION.

The researches of recent years have conclusively settled the general connection between the spark potential and the pressure of a gas. It is now well known that as the pressure of a gas diminishes the difference of potential necessary to produce a discharge between electrodes in the gas, a fixed distance apart, also diminishes until at a critical pressure the spark potential reaches a minimum value. It is further established that below the critical pressure the potential difference required to produce discharge rapidly increases as the pressure is lowered.

This connection between the spark potential and the corresponding pressure of a gas has been well illustrated in a series of curves drawn by Peace,[1] who investigated the sparking potentials between a pair of parallel plates at pressures ranging from one-half an atmosphere down to a little below the critical pressure.

Among others, Strutt[2] and Bouty[3] have carried on the investigation at pressures considerably below the critical point and the results show that, once the critical pressure has been passed, the rise in potential difference necessary to produce discharge is exceedingly rapid.

The effect of varying the distance between the electrodes was first determined by Paschen,[4] who observed the existence of a simple law connecting the pressure at which discharge took place with the corresponding spark potential and the distance between the electrodes.

Paschen's results showed that when a given potential difference was applied to two spherical electrodes whose distance apart could be varied, the maximum pressure at which discharge occurred varied inversely with the distance between the spheres.

---

[1] Peace, Proc. Roy. Soc., Vol. 52, p. 99.

[2] Strutt, Phil. Trans., Vol. 193, p. 377.

[3] Bouty, Comp. Rend., Vol. 131 (2), p. 443.

[4] Paschen, Ann. d. Phys., Vol. 87, p. 69.

The range of pressures over which he found the law to apply, while considerable, did not extend below 2 cm. of mercury, and his results do not in any case indicate that the critical pressure had been reached. It is evident then that Paschen's conclusions are confined to pressures higher than the critical pressures.

Since the statement of this law by Paschen, Peace[1] alone seems to have published results which could throw any additional light on the conditions holding for discharge in a gas at very low pressures. Peace experimented in air, with parallel plates as electrodes, at various distances apart and found that the value of the critical pressure increased greatly as the distance between the electrodes was lessened, but his results at points below the critical pressure give no evidence of the existence of any such law as had been enunciated by Paschen.

This can be readily seen from the numbers recorded in his paper, a few of which, selected from readings taken below the critical pressure, are given in the following table. These results admit of easy comparison since the potential difference in the cases chosen are very nearly the same. The product of pressure and spark length should be a constant quantity, if Paschen's law held.

TABLE OF PEACE'S RESULTS.

Applied potential difference in volts	Pressure in mm. of mercury.	Distance between electrodes in inches.	Product of pressure and spark length.
649	2·5	·082	·205
660	6	·005	·030
670	5	·021	·105
731	2·5	·030	·075

If we compare the first and second of these results where the difference in spark potential is only 11 volts, we find the product in the first case nearly seven times that in the second. Again, the product corresponding to the spark potential, 660 volts, is less than one-third that corresponding to 670 volts, a large difference in the opposite direction. The same irregularity is exhibited by the product corresponding to the spark potential, 731 volts, and it seems difficult to understand how experimental errors could be made to explain such a wide divergence of results.

At the critical pressure Peace's results point to the existence of the law, but, as stated above, it would appear that as soon as lower pressures were approached the indications were uniformly against the existence of the relation which Paschen found to hold at high pressures.

---

[1] Peace, Proc. Roy. Soc., Vol. 52, p. 99.

Owing to the special precautions taken by Peace to obtain accurate values for the spark potentials, it is possible to arrive at but one of two conclusions regarding the departure from Paschen's law indicated by Peace's numbers. Judging by the results, either the law ceases to hold when the critical pressure is passed or else the apparatus used by him in his experiments did not admit of an accurate measurement of the actual spark lengths corresponding to different spark potentials.

A short discussion of the apparatus will reveal one considerable defect. The object of the investigations of both Paschen and Peace was to determine the electromotive intensity requisite to cause discharge in a gas. Throughout the range of pressures investigated by Paschen the discharge always took place along the shortest distance between the spherical electrodes, and the electromotive intensity requisite to break down the gas was, therefore, directly proportional to the spark potentials obtained by him. At points below the critical pressure, as Peace's results indicate, discharge occurs more easily over a longer distance than over a shorter one, and if the values of the electromotive intensities necessary to break down a gas at different pressures are to be compared, it is necessary to know in each case not only the potential difference applied to the electrodes, but also the path between the electrodes along which the initial discharge occurs.

To insure passage of the discharge over the same length of path Peace used plane parallel plates of very large diameter as electrodes; but while in this way he obtained a uniform field of considerable extent, and so was able to obtain an accurate measure of the electromotive intensity between the electrodes, he failed to make certain that the path along which the gas initially broke down was always confined to the uniform part of the field. As mentioned in his paper, there was considerable tendency at low pressures to a brush discharge from the edges of the plates and this indicated a defect in his apparatus which apparently he did not completely eliminate.

In the present paper an account is given of an investigation on the potentials necessary to produce discharge in a gas, with a form of apparatus which insured the passage of the discharge in a uniform electric field.

With this apparatus the discharge potentials have been determined for different distances between the electrodes over a range extending considerably above and below the critical pressure. The results of the investigation not only confirm the truth of the law enunciated by Paschen for discharges at high pressures, but also demonstrate beyond doubt the applicability of the same law to the critical pressure and to all pressures below it.

The existence of the same relation has been sought in each of the gases, air, hydrogen, and carbon dioxide, and the result of the investigation has been the establishment with equal certainty of the same general law for all pressures, viz., that with a given potential difference, the field being uniform, the product of the pressure at which discharge occurs, and the distance between the electrodes, is constant.

II. DESCRIPTION OF APPARATUS.

The form of the discharge chamber is shown in Fig. I.

The electrodes consisted of two plane brass plates *a*, *a*, 3·6 cm. in diameter, embedded in ebonite as shown in the figure, the outer faces of the electrodes being flush with the surface of the ebonite. These pieces of ebonite which carried the electrodes served also to close the glass tube *T*, *T*, which thus constituted a discharge chamber. In order to confine the gas in this chamber to the region where the electric field was uniform, a ring of ebonite *C*, *C*, which projected over the edges of the brass plates, was inserted. In the construction of the apparatus special precautions were taken to insure that the plugs *B*, *B*, pressed tightly against the ebonite ring. As a result of this device, that portion of the electric field which was not uniform was

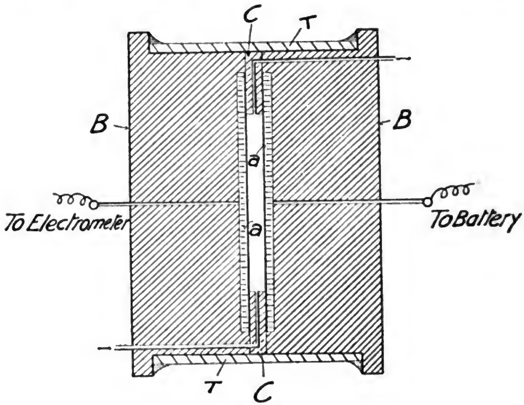


FIG. 1.

entirely confined to the space occupied by ebonite, so that in this way it was rendered impossible for a discharge to occur through the gas in any but a uniform field. The thickness of the ebonite ring, which could be made accurate to $^1/_{1000}$ mm., determined the distance between the electrodes and consequently the length of the discharge. The length of the discharge could be varied at will, therefore, by inserting rings of different thicknesses.

The gas was admitted and removed from the chamber by glass tubes sealed into the ebonite plugs, and these tubes were connected with the air space by two very fine channels leading through the ebonite ring.

Before closing the discharge tube, which was made air-tight with ordinary commercial soft wax, the inner surface of the ebonite ring was carefully rubbed with glass paper to remove any conducting material from its surface.

The potential differences used in these experiments were obtained from a series of small storage cells, similar to those used in the Reichsanstalt, Berlin. As these cells have a large capacity their voltage remained constant over long intervals of time, and as a consequence it was possible to make the readings with the greatest accuracy. The potential differences were measured by a Weston voltmeter which was carefully calibrated by means of a potentiometer furnished with a standard Weston cadmium element.

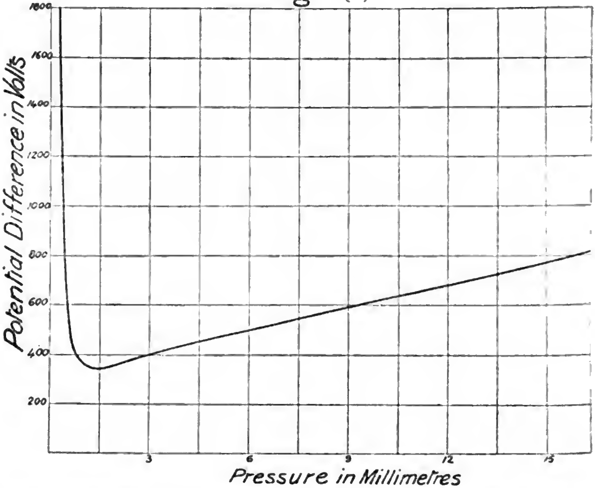
Throughout the investigation the discharge chamber was connected in series with a drying tube containing phosphoric pentoxide, a glass reservoir about two litres in volume, a McLeod pressure gauge giving readings accurate to $^1/_{1000}$ of a mm., and a mercury pump of small capacity. By using this reservoir and the pump of small capacity it was possible to diminish the pressure in the discharge tube by such exceedingly small amounts that it was easy to obtain a series of discharge potentials over the whole range of pressures investigated without the necessity of admitting fresh gas to the chamber.

In making measurements one terminal of the battery was joined to earth and the other terminal was connected through a resistance of xylol to one of the electrodes of the discharge tube. The other electrode was permanently joined to one pair of quadrants of a quadrant electrometer, the second pair of which was kept to earth. In determining the potential difference necessary to produce discharge at a given pressure, the electrometer electrode was first earthed, a given potential applied to the battery electrode and the earth connection of the electrometer electrode then removed.

If, after waiting some minutes, no discharge passed, the operation was repeated with a slightly higher potential applied to the battery electrode. This procedure was followed until a potential sufficiently high was reached to break down the gas and cause a discharge. The passage of the discharge could be readily noted as it was accompanied by a violent deflection of the electrometer needle.

The well known phenomenon of delay in the passing of the discharge, which has been investigated at length by Warburg,[1] was observed throughout the experiments. It was especially marked in the neighbourhood of the critical pressure, discharges being frequently obtained ten or even fifteen minutes after the requisite voltage had been applied.

Fig. 11 (a)



In every case, therefore, as the minimum sparking potential for any pressure was approached, a considerable time was allowed to elapse, with a given applied potential difference, before any increase was made.

III. Experiments in Air.

In the experiments on atmospheric air the whole discharge apparatus was first exhausted to a very low pressure and then refilled by fresh air, which bubbled in very slowly, first through a wash-bottle of sulphuric acid and then through a tube tightly packed with phosphoric pentoxide. The discharge chamber was then exhausted to about 20 mm. of mercury and allowed to stand at this pressure for a period of from eight to twelve hours.

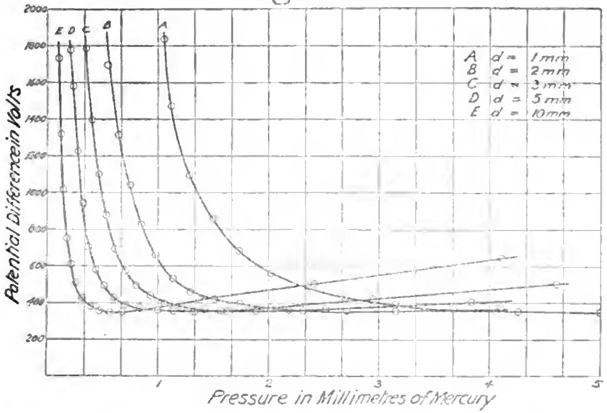
---

[1] Warburg, Ann. d. Phys., Vol. 62, p. 385.

During this time the air was always in contact with phosphoric pentoxide in the drying tube, and was, therefore, entirely free from moisture when the measurements were taken.

The first measurements were made with the electrodes 3 mm. apart, and the spark potentials were determined over a range of pressures extending from 51 mm. down to ·35 mm. of mercury. The spark potentials corresponding to the various pressures are recorded in columns 5 and 6 of Table I., and the results are represented graphically in Fig. II., a.

Fig. II – Air



In making these determinations the precaution was always taken of allowing eight or ten minutes to intervene between consecutive readings in order to make certain that the air was in its normal condition when the discharge occurred. As can be seen from the figure the curve is quite regular and exhibits all the peculiarities already noted by Peace,[1] Strutt,[2] and Bouty[3]. The curve, however, is carried much higher than those drawn by any of these experimenters, discharges corresponding to potential differences of over eighteen hundred volts being recorded.

---

[1] **Peace, Roy. Soc. Proc., Vol. 52, p. 111.**

[2] **Strutt, Phil. Trans., Vol. 193, p. 384.**

[3] **Bouty, Comp. Rend., Vol. 131 (2), p. 446.**

TABLE I. AIR.

Spark length = 1 mm.		Spark length = 2 mm.		Spark length = 3 mm.		Spark length = 5 mm.		Spark length = 10 mm.	
Pressures in mm. of mercury	Spark potential in volts	Pressures in mm. of mercury	Spark potential in volts	Pressures in mm. of mercury	Spark potential in volts	Pressures in mm. of mercury	Spark potential in volts	Pressures in mm. of mercury	Spark potential in volts
150·	1510	20·	620	51·	1480	7·34	600	7·09	831
120·	1265	13·2	527	41·5	1275	4·61	504	4·12	645
90·	1025	8·73	455	31·5	1015	2·95	418	2·30	504
61·	784	5·52	400	21·4	790	1·85	368	1·39	420
40·8	634	4·11	373	14·1	630	1·57	356	·982	372
21·6	489	3·16	355	9·31	526	1·34	349	·805	355
19·4	477	2·71	351	5·99	452	1·14	352	·679	348
12·4	417	2·32	357	3·84	405	·982	359	·562	351
7·77	367	2·02	371	2·51	371	·839	370	·466	359
6·66	357	1·75	389	2·18	361	·714	388	·384	377
5·80	352	1·52	419	1·89	356	·607	427	·312	425
4·98	349	1·30	460	1·64	358	·517	484	·259	504
4·27	355	1·13	534	1·42	364	·440	575	·219	605
3·67	368	·982	654	1·22	375	·375	705	·180	757
3·15	392	·857	826	1·06	397	·321	935	·152	1020
2·70	429	·750	1042	·928	441	·276	1223	·125	1315
2·35	481	·643	1312	.804	494	·232	1585	·105	1730
2·02	558	·549	1695	·710	576	·216	1774		
1.74	681	·536	1829	.616	691				
1.51	855			·536	863				
1·29	1090			·465	1002				
1·12	1463			·411	1305				
1·05	1826			·357	1786				

The distance between the electrodes was then varied and five different sets of readings were taken in air with the electrodes 1, 2, 3, 5, and 10 mm. apart, respectively. The complete set of numbers for these different spark lengths is given in Table I., and curves showing the readings taken over that portion of the range of pressure below 5 mm. of mercury are exhibited in Fig. II.

It is apparent from the relative positions of these curves in the figure, that at points at and below the critical pressures, with a given potential difference applied to the electrodes, the pressures at which discharges occurred regularly decreased as the distance between the electrodes was increased. But a critical examination of the curves and also a reference to the numbers which they represent show that Paschen's law is rigidly applicable over the whole series of discharge potentials recorded.

For example, the pressures at which discharge took place with an applied potential of 1800 volts were, for the different distances between the electrodes, approximately:—

Distance between electrodes in mm.	Discharge pressures in mm. of mercury.
1	1·05
2	·536
3	·351
5	·216
10	·105

and it will be seen that the numbers in column 2 are almost exactly in inverse proportion to the numbers in column 1.

Again, with an applied potential of 500 volts (say), the approximate pressures at which discharge occurred were:—

Distance between the electrodes in mm.	Discharge potential in mm. of mercury.
1	2·35
2	1·30
3	·804
5	·517
10	·259

where the pressures are in the ratio 1·00: ·55: ·34: ·22: ·11, numbers which are again very nearly inversely proportional to the distance between the electrodes.

Further, we notice that the spark potential corresponding to the critical pressure in all cases was practically the same, 350 volts, and the values of the critical pressures for the different spark lengths were, from Table I.:—

Distance between electrodes in mm.	Discharge pressures in mm. of mercury.
1	4·98
2	2·71
3	1·89
5	1·34
10	·679

and these numbers while not exactly in the ratio 10: 5: 3: 2: 1, are still very close to it.

In finding the values for portions of the curves around the critical pressures the results given in Table I. show that a small variation in potential difference was associated with a relatively very large change in the pressures, so that a very small error in reading the potential difference would result in a large error in the pressure readings. It is interesting to note, however, that even under these unfavourable conditions a striking agreement is presented between the results obtained at critical pressures and the results demanded by Paschen's law.

In order to make the agreement between the numbers demanded by Paschen's law and those obtained in these experiments still more evident, the results recorded in Table I. are again given in a slightly different form in Table II., where each potential difference is associated with the product of the pressure at which discharge took place and the corresponding spark length. Paschen[1] found that at high pressures these products were constant for different distances between the electrodes, as long as the applied potential difference was the same.

The numbers recorded in Table II. show that the same law is rigidly applicable to all pressures both high and low.

---

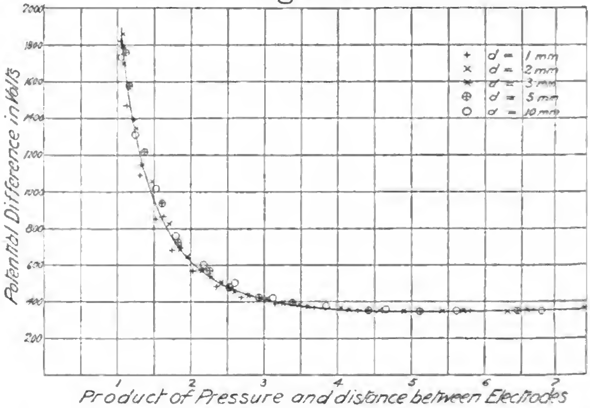
[1] Paschen, Ann. d. Phys., Vol. 37, p. 69.

TABLE II. AIR.

Spark length = 1 mm.		Spark length = 2 mm.		Spark length = 3 mm.		Spark length = 5 mm.		Spark length = 10 mm.	
Product of pressure and spark length	Spark potential in volts	Product of pressure and spark length	Spark potential in volts	Product of pressure and spark length	Spark potential in volts	Product of pressure and spark length	Spark potential in volts	Product of pressure and spark length	Spark potential in volts
150·	1510	40·	620	153·	1480	36·7	600	70 9	831
120·	1265	26·4	527	124·5	1275	23·0	504	41·2	645
90·	1025	17·4	455	94·5	1015	14·7	418	23·9	504
61·	784	11·0	400	64·2	790	9·25	368	13·9	420
40·8	634	8·22	373	42·3	630	7·85	356	9·82	372
21·6	489	6·32	355	27·9	526	6·70	349	8·05	355
19·4	477	5·42	351	17·9	452	5·70	352	6.79	348
12·4	417	4·64	357	11·5	405	4·91	359	5·62	351
7·77	367	4·04	371	7·53	371	4·19	370	4·66	359
6·66	357	3·50	389	6·54	361	3·57	388	3·84	377
5·80	352	3·04	419	5·67	356	3·03	427	3·12	425
4·98	349	2·60	460	4·92	358	2·58	484	2·59	504
4·27	355	2·26	534	4·26	364	2·20	575	2·19	605
3·67	368	1·96	654	3·66	375	1·87	705	1·80	757.
3·15	392	1·71	826	3·18	397	1·60	935	1·52	1020
2·70	429	1·50	1042	2·78	441	1·38	1223	1·25	1315
2·35	481	1·28	1312	2·41	494	1·16	1585	1·05	1730
2·02	558	1·09	1695	2·13	576	1·08	1774		
1·74	681	1·07	1829	1·84	691				
1·51	855			1·60	863				
1·29	1090			1·39	1092				
1·12	1463			1·23	1395				
1·05	1826			1·07	1786				

A like conclusion must be drawn from the curve shown in Fig. III., which graphically represents the numbers in Table II. In plotting this curve the products of spark lengths and discharge pressures were taken as abscissæ and the sparking potentials as ordinates. The regularity of the curve which represents the products for the five different electrode distances shows clearly that there can be no doubt regarding the applicability of Paschen's law to electric discharges in air at pressures at and below the critical point as well as to pressures above it.

Fig. III—Air



IV. Experiments in Hydrogen.

In order to demonstrate, if possible, the generality of the law which has just been proven to hold for discharges in air, a series of measurements were made on the spark potentials in the gases hydrogen and carbon dioxide.

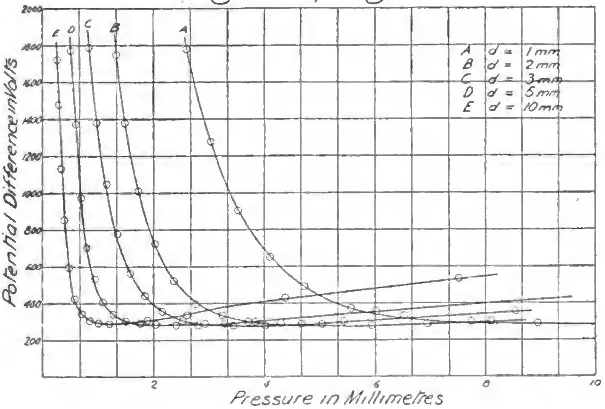
In these experiments exactly the same apparatus was used as in the previous experiments in air.

Preparatory to making the measurements in hydrogen the apparatus was first exhausted of air to a pressure of 1 mm. of mercury or less, and then filled with hydrogen to atmospheric pressure. It was then exhausted and refilled with hydrogen several times to make certain that all air was removed.

The hydrogen was prepared from zinc and sulphuric acid in a Kipp apparatus, and, in order to insure purity and freedom from moisture, was passed through wash-bottles containing potassium permanganate and caustic potash and through a tube tightly packed with phosphoric pentoxide, before being led into the discharge chamber.

Also, just as in the experiments in air, the gas was always allowed to stand for several hours at a pressure of about 20 mm. of mercury in the presence of phosphoric pentoxide, before any readings were recorded.

Fig IV-Hydrogen



In the experiments with this gas readings were taken for the same electrode distances, 1, 2, 3, 5, and 10 mm., and the values of the spark potentials and their corresponding pressures are given in Table III. These numbers are also graphically set forth in Fig. IV.

We see from this table that the readings corresponding to the spark potential 1800 volts are:—

Distance between electrodes in mm.	Discharge pressure in mm. of mercury.
1	2·60
2	1·33
3	·861
5	·516
10	·264

which pressures are in the ratio 9·9: 5·0: 3·2: 1·9: 1.

TABLE III. HYDROGEN.

Spark length = 1 mm.		Spark length = 2 mm.		Spark length = 3 mm.		Spark length = 5 mm.		Spark length = 10 mm.	
Pressures in mm. of mercury	Spark potential in volts	Pressures in mm. of mercury	Spark potential in volts	Pressures in mm. of mercury	Spark potential in volts	Pressures in mm. of mercury	Spark potential in volts	Pressures in mm. of mercury	Spark potential in volts
21·7	328	23·	435	13·6	415	13·6	469	7·53	526
16·2	300	14·8	360	8·54	356	9·35	415	4·37	427
11·9	281	11·0	323	5·40	301	6·02	350	2·55	335
10·3	278	8·08	299	4·66	286	3·80	300	1·77	299
8·94	287	6·95	285	4·02	278	3·28	287	1·46	283
7·74	306	5·93	279	3·44	282	2·80	281	1·22	287
6·52	335	5·04	284	2·93	292	2·41	282	1·01	295
5·57	374	4·30	293	2·52	310	2·05	285	·846	313
4·73	487	3·72	305	2·15	356	1·76	293	·700	343
4·11	649	3·23	333	1·85	440	1·51	305	·575	426
3·54	905	2·77	399	1·59	564	1·26	345	·470	595
3·04	1275	2·36	523	1·35	780	1·09	410	·390	850
2·60	1781	2·03	727	1·16	1054	·928	539	·330	1142
		1·73	1010	1·00	1382	·808	706	·276	1477
		1·48	1380	·861	1780	·700	975	·264	1710
		1·33	1746			·600	1373		
						·516	1775		

TABLE IV. HYDROGEN.

Spark length = 1 mm.		Spark length = 2 mm.		Spark length = 3 mm.		Spark length = 5 mm.		Spark length = 10 mm.	
Product of pressure and spark length	Spark potential in volts	Product of pressure and spark length	Spark potential in volts	Product of pressure and spark length	Spark potential in volts	Product of pressure and spark length	Spark potential in volts	Product of pressure and spark length	Spark potential in volts
21·7	328	46·	435	40·8	415	68·	469	75·3	526
16·2	300	29·6	360	25·6	356	46·7	415	43·7	427
11·9	281	22·0	323	16·2	301	30·1	350	25·5	335
10·3	278	16·1	299	13·9	286	19·0	300	17·7	299
8·94	287	13·9	285	12·0	278	16·4	287	14·6	283
7·74	306	11·8	279	10·3	282	14·0	281	12·2	287
6·52	335	10 0	284	8·79	292	12·0	282	10·1	295
5·57	374	8·60	293	7·56	310	10·2	285	8·46	313
4·73	487	7·44	305	6·45	356	8·80	293	7.00	343
4·11	649	6·46	333	5·55	440	7·55	305	5·75	426
3·54	905	5·54	399	4·77	564	6·30	345	4·70	595
3·04	1275	4·72	523	4·05	780	5·45	410	3·90	850
2·60	1781	4·06	727	3·48	1054	4·64	539	3·30	1142
		3·46	1010	3·00	1382	4·04	706	2·76	1477
		2·96	1380	2·58	1789	3·50	975	2·64	1710
		2·66	1746			3·00	1373		
						2·58	1775		

Again, with a spark potential of 500 volts, the readings give:—

Distance between electrodes in mm.	Discharge pressure in mm. of mercury.
1	4·7
2	2·4
3	1·7
5	·94
10	·51

the pressures being in the ratio 9·3: 4·8: 3·3: 1·9: 1.

The minimum spark potential in hydrogen was about 280 volts and the critical pressures corresponding to the different spark lengths were:—

Distance between electrodes in mm.	Discharge pressures in mm. of mercury.
1	10·3
2	5·93
3	4·02
5	2·80
10	1·46

where the various discharge pressures are once more nearly inversely proportional to the distance between the electrodes.

To indicate further that the law is applicable at all points, a table of products similar to those recorded for air was calculated, and is given in Table IV. A single curve, Fig. V., represents these five sets of readings, and again the close grouping of the different results about this common curve shows that the law is equally applicable above and below the critical pressure to all spark potentials.

It is evident, then, that with hydrogen just as with air, Paschen's law is rigidly applicable over the whole range of pressures.

V. Experiments in Carbon Dioxide.

These further experiments were made with a view to corroborate the results already obtained in air and hydrogen. The same apparatus as had been used with these two gases again served for the experiments in carbon dioxide and the distance between the electrodes was varied as before, so that readings were obtained at the five different

Fig V - Hydrogen

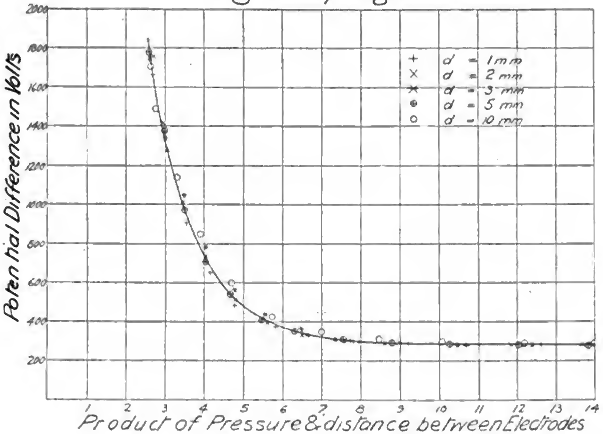
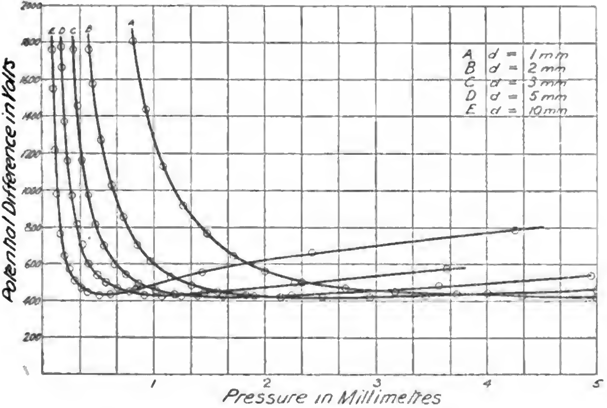


Fig VI Carbon Dioxide



distances, 1, 2, 3, 5, and 10 mm. The carbon dioxide was prepared by treating marble with hydrochloric acid and was purified and dried by being bubbled through a wash-bottle of water and passed through a tube tightly packed with phosphoric pentoxide before reaching the discharge apparatus. In each case the operation of exhausting the whole discharge apparatus to 1 mm. or less, of mercury, and then refilling with carbon dioxide, was repeated five or six times, and finally the gas was allowed to stand, as in both previous cases, in the presence of a bulb of phosphorus pentoxide for several hours.

The complete set of results is given in Table V. and the corresponding curves set forth in Fig. VI., and if we again compare the discharge pressures and spark lengths corresponding to any value of the applied potential, the same law is seen to hold here also with even greater rigidity than in the other cases.

For 1800 volts the figures are approximately:—

Distance between electrodes in mm.	Discharge pressures in mm. of mercury.
1	·817
2	·421
3	·274
5	·164
10	·0892

where the pressures are almost in the required ratio, being 9·2: 4·8: 3·0: 1·9: 1.

For 500 volts the numbers are:—

Distance between electrodes in mm.	Discharge pressures in mm. of mercury.
1	2·34
2	1·23
3	·84
5	·57
10	·28

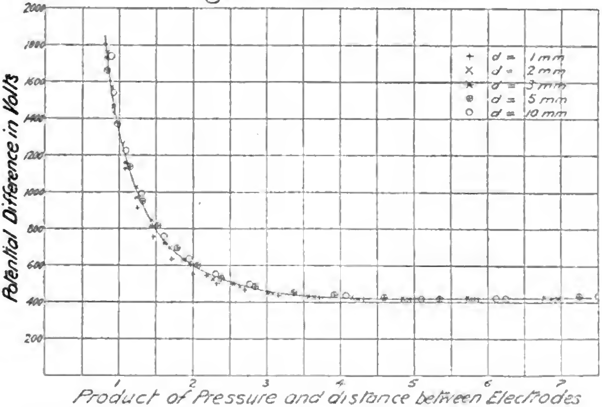
where the pressures are as 8·4: 4·4: 3: 2: 1.

And at the minimum discharge potentials which are again constant, 420 volts, the readings given are:—

Distance between electrodes in mm.	Discharge pressures in mm. of mercury,
1	5·02
2	2·52
3	1·63
5	1·07
10	·510

Special attention is directed to these latter results, inasmuch as the exactness of the ratio indicated by the pressures is very remarkable The ratios of the pressures are practically 10: 5: 3·1: 2: 1, the nearest approximation to the numbers demanded by Paschen's law which has been shown by any of the comparisons, and this result is all the more convincing in that these figures were obtained at the critical points where in the other two gases the results obtained indicated the law in a somewhat less marked degree.

Fig VII Carbon Dioxide



Though it would appear that further evidence was unnecessary, the table of products was again calculated and is given in Table VI. Also the corresponding curve is shown in Fig. VII.

Once more the regularity of the curve shows that as in air and hydrogen so in carbon dioxide Paschen's law is rigidly applicable to all spark potentials both above and below the critical pressure.

VI. SPARK POTENTIALS WITH DIFFERENT ELECTRODES.

It has now been shown, using brass electrodes of constant size, that for discharges in a uniform field in any gas, the values of the spark potentials are determined solely by the product of the pressure of the gas and the distance between the electrodes. From this result it appeared that if the size or material of the electrodes did not affect the results, the spark potentials were dependent only upon the quantity of the gas per unit cross section between the electrodes.

In order to determine this point the brass electrodes which had been used up to this time were replaced in turn by electrodes of iron, zinc and aluminium of exactly the same size. The results of the experiments showed that there was no variation in the different sets of readings and it was evident that there was not the slightest effect produced in any case by a change in the material of which the electrodes were made.

In order to see if the size of the electrodes affected the values of the spark potentials for the different pressures, provided the discharge took place in a uniform field, a reduction was made in the surface of the electrodes exposed to the gas. This was done by replacing the ebonite rings *C*, *C*, Fig. I., which had an inner diameter of 3 cm., by others whose inner diameter was but 1 cm. By this device the areas of the electrodes exposed to the gas were reduced to about $^1/_{10}$ of their value in the early experiments, and the condition that the discharge could only take place in a uniform field still held. Using this apparatus, with air, no difference could be observed in the values of the discharge potentials corresponding to the different pressures, and it was therefore certain that the value of the spark potential was in no way influenced by the size of the electrodes.

It is therefore clearly established that the only factors that affect the spark potentials are pressure and the distance between the electrodes, and hence Paschen's law is most accurately expressed by saying: "That, with a given applied potential difference, discharge in a uniform field, in any gas, at pressures both above and below the critical pressures, is dependent solely on the constancy of the quantity of matter per unit cross section between the electrodes."

Every assistance towards the carrying of my research to a successful issue has been given me throughout by President Loudon, and I gratefully accept this opportunity of thanking him. I also wish to record my appreciation of the many kind suggestions of Professor J. C. McLennan, in whose laboratory the experiments were performed and to whom I owe much for their success.

TABLE V. CARBON DIOXIDE.

Spark length = 1 mm.		Spark length = 2 mm.		Spark length = 3 mm.		Spark length = 5 mm.		Spark length = 10 mm.	
Pressures in mm. of mercury	Spark potential in volts	Pressures in mm. of mercury	Spark potential in volts	Pressures in mm. of mercury	Spark potential in volts	Pressures in mm. of mercury	Spark potential in volts	Pressures in mm. of mercury	Spark potential in volts
19·8	516	21·3	802	8.75	674	9·10	790	7·27	993
12·6	480	13·8	645	5·57	563	5·77	674	4·26	790
9·41	443	8·76	519	3·55	477	3·64	579	2·43	656
6·83	425	5·41	464	2·25	427	2·33	498	1·44	553
5·86	421	4·02	439	1·91	420	1·45	438	·860	473
5·02	419	3·46	426	1·63	419	1·25	423	·612	428
4·31	420	2·95	421	1·41	425	1·07	421	·510	423
3·73	427	2·52	419	1·20	432	·919	428	·409	440
3·18	443	2·15	420	1·02	449	·786	441	·340	470
2·73	475	1·84	427	·875	487	·678	464	·280	506
2·34	503	1·58	443	·758	542	·572	495	·239	563
2·00	559	1·34	473	·651	609	·492	533	·196	639
1·72	636	1·16	525	·558	699	·419	599	·162	761
1·47	763	·980	605	·482	815	·360	704	·134	973
1·26	916	·848	702	·420	971	·310	820	·111	1219
1·08	1127	·728	847	·362	1162	·266	969	·094	1550
·946	1432	·625	1026	·314	1445	232	1159	·089	1730
·817	1801	·536	1258	·274	1756	·196	1373		
		·455	1574			·169	1662		
		421	1762			·164	1770		

TABLE VI. CARBON DIOXIDE.

Spark length = 1 mm.		Spark length = 2 mm.		Spark length = 3 mm.		Spark length = 5 mm.		Spark length = 10 mm.	
Product of pressure and spark length	Spark potential in volts	Product of pressure and spark length	Spark potential in volts	Product of pressure and spark length	Spark potential in volts	Product of pressure and spark length	Spark potential in volts	Product of pressure and spark length	Spark potential in volts
19·8	516	42·6	802	26·2	674	45·5	790	72·7	993
12·6	480	27·6	645	16·7	563	28·8	674	42·6	790
9·41	443	17·5	519	10·6	477	18·2	579	24·3	656
6·83	425	10·8	464	6·75	427	11·6	498	14·4	553
5·86	421	8·04	439	5·73	420	7·25	438	8·60	473
5·02	419	6·92	426	4·89	419	6·25	423	6·12	428
4·31	420	5·90	421	4·23	425	5·35	421	5·10	423
3·73	427	5·04	419	3·60	432	4·59	428	4·09	440
3·18	443	4·30	420	3·06	449	3·93	441	3·40	470
2·73	475	3·68	427	2·62	487	3·30	464	2·80	506
2·34	503	3·16	443	2·27	542	2·86	495	2·39	563
2·00	559	2·68	473	1·95	599	2·46	533	1·96	639
1·72	636	2·32	525	1·67	699	2·09	599	1·62	761
1·47	763	1·96	605	1·44	815	1·80	704	1·34	973
1·26	916	1·69	702	1·26	971	1·55	820	1·11	1219
1·08	1127	1·45	847	1·08	1162	1·33	969	·946	1550
·946	1432	1·25	1026	·942	1445	1·16	1159	·802	1730
·817	1801	1·07	1258	·822	1756	·98	1373		
		·910	1574			·845	1662		
		·842	1762			·820	1770		

ROYAL SOCIETY OF CANADA

TRANSACTIONS

SECTION IV.

GEOLOGICAL AND BIOLOGICAL SCIENCES

PAPERS FOR 1902

I.—*Osmundites skidegatensis*, n. sp.

By D. P. PENHALLOW.

(Read May 27, 1902.)

(By permission of the Acting Director of the Geological Survey.)

PLATES I-VI.

The material upon which the following studies are based, was received from the Director of the Geological Survey of Canada early in the present year.[1] It was found to consist of several fragments of what appeared to be stems, and a number of fragments of leaves. In transmitting these specimens to me, the observation was made that the stems were believed to represent some form of Cycadaceous plant. They were all obtained from Alliford Bay, Skidegate Inlet, Queen Charlotte Islands, by Dr. C. F. Newcombe, of Victoria, B.C., in 1897. In two instances they gave evidence of having been exposed for some time to the action of salt water, by reason of barnacles attached to their surfaces. Dr. G. M. Dawson informs me that the age of the deposit to which these fossils belong is undoubtedly Lower Cretaceous, and a full account of the formation may be found in his report upon the Geology of the Queen Charlotte Islands for 1878-1879.[2]

MACROSCOPIC CHARACTERS.

The material of most definite value consists of fourteen fragments of stems, all of which are highly calcified. When small fragments were treated with hydrochloric acid, they were found to undergo rapid solution with violent effervescence, leaving a residuum of rather large volume and composed of black, angular fragments like chips of lignite. These were found to be very brittle, and although soft, were quickly broken up when probed with a needle. When this residue was ignited in an open crucible, it oxidized rapidly, but without much apparent diminution in volume, to a gray ash which gave no further solution with hydrochloric acid. A quantitative estimation of the proximate constituents of the fossil gave the following results:—

Soluble in hydrochloric acid	70·49
Combustible matter	17·36
Insoluble residue	12·15
	100·00

---

[1] Dr. G. M. Dawson, 1898.

[2] Report of Progress, Geol. Surv. of Canada, 1878-1879, 29, 63-77B.

These results are of interest as showing the relatively small extent to which silica enters into the process of fossilization in this case, and the large amount of organic residue retained by the body of the calcified mass.

The several fragments of stems vary in diameter from 2 to 4 cm.—differences which may be ascribed in part to varying age, and in part, also, to the removal of more readily separable external parts in some cases and their retention in others. The length was found to vary from one or two centimetres to upwards of 9·5 cm. Upon careful examination, this variation was found to result from the development of frequent transverse cleavage planes, proceeding from crystallization of the carbonate of lime, and several of these fragments were clearly parts of one stem in their original condition. The evidence in this direction seemed to point to the conclusion that even the largest specimen was only a fragment or small part of the original stem, a conclusion more fully sustained by subsequent study of the internal structure, and comparison with stems of existing species of the same type.

Although presenting certain individual differences of minor importance, all of the specimens agree in their principal characteristics with respect to:—

(1) General form and structure.

(2) The development of numerous transverse cleavage planes.

(3) The prevailing colour.

(4) The appearance of strongly defined surface grooves and ridges parallel to the principal axis.

(5) The very unequal distribution of these ridges on opposite sides.

(6) The presence of emergent organs.

A detailed consideration of these features will serve to more clearly define the character of the plant.

The dominant colour is grayish black. Closer inspection, nevertheless, shows that the surface ridges are frequently of a dull red colour, while the intermediate areas are a dull black. The polished transverse section is coal black, while the cut and unpolished surface is of a slaty black colour.

Local crystallization of the calcite has resulted in the formation of numerous transverse cleavage planes, varying very greatly in thickness and in extent of separation. The more prominent of these occur at intervals of 10-12 mm., and they are often only 0·5 mm. in thickness. Through them the original stem has been broken up into shorter fragments, in consequence of which it is in some cases impossible to determine the proper external aspect and dimensions from a single specimen. The less prominent of the cleavage planes occur at variable and frequent intervals, and they cause a breaking off of external parts in such a way as to give a columnar or basaltic aspect to the specimens (Plate I., fig. 1), while they also contribute to a very ready and often extended removal of external parts whereby, under the influence of even slight mechanical effects, the size of the specimen may be readily reduced. It is, therefore, possible to account for the differences in diameter presented by some of the specimens, more particularly when it is recalled that some of the smallest had undoubtedly been exposed for some time to the action of salt water, as shown by the presence of barnacles.

In nearly all the specimens, the stem enlarges gradually upward. As shown in the photograph (Plate I., fig. 1), a stem having a total length of 9·5 cm. is 2·5 cm. broad at the base and 3·5 cm. broad at the upper end. In two specimens no such variation was observed, from which the conclusion was drawn that the tapering specimens represent the basal portions of stems, while the latter were derived from a higher position where the diameter was more uniform. This is in harmony with the view already stated, that the specimens as now found belonged to stems of far greater length than any of the single fragments. These views are also sustained by evidence derived from comparison with the rhizomes of related existing species.

In nearly all the specimens the surface is made up of a series of longitudinal grooves and ridges, with no evidence of cortication; but in two cases there were found prominent areas of glistening, coaly matter suggestive of the former presence of a structure allied to a cortex. A brief examination, however, was sufficient to disclose the fact that the coaly matter had been derived from structures similar to those constituting the surface ridges, and this conclusion, taken in connection with evidence derived from comparison with existing species, led to the final conclusion that no real cortex could have been present in the original plant, and that the coaly matter represents the decayed bases of the outermost portions of the stipes.

The longitudinal ridges to which reference has already been made, and which have been described as of a dull red colour, are often several centimetres long. They are normally flattened radially into a somewhat broadly lenticular transverse section, and are generally about 5 mm. broad (Plate I., fig. 1) and fig. 1. Where most numerous, they are separated by very slight intervals in such a way as to suggest overlapping in the original plant. It is, moreover, seen that they arise at different levels on the central axis, and in such a way that the newer ones are continually overlapped by the older, thus bringing about the upward enlargement already noted. (Plate I., fig. 1.) It is also observed that these ridges vary in size and number on opposite sides of the stem. Thus on one side, as shown in Plate I., fig. 1, they are large and numerous, while on the opposite side they are conspicuously smaller, being reduced to 3 mm., and less numerous. Among the latter may be noted numerous small, oval processes upwards of 1·5 × 2·5 mm., representing emergent organs which have been cut off abruptly near the surface. That these processes represent emergent roots, and the longitudinal ridges represent the persistent bases of stipes which had become more or less closely knit together into an outer layer, seemed altogether probable, and this view was later confirmed not only by an examination of the internal structure, but by comparison with existing species in which precisely the same general appearances and relations of parts are to be met with. Attention being directed somewhat more critically to the relations between the stele and the stipes, it was found (Plate I., fig. 1) that the latter are given off at an angle of about (10°) ten degrees. This is in all probability somewhat too low a value, in consequence of the compression to which the specimens must have been subjected before complete mineralization, and yet, from determinations in Osmunda regalis and O. cinnamomea, it is to be regarded as not very much below the actual divergence.

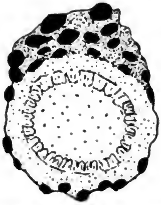


FIG. 1.—OSMUNDITES SKIDEGATENSIS. x 1/1

The larger end of one of the most characteristic specimens was carefully cut and polished, when it was found that four separate regions of structure could be distinguished, (fig. 1). These consist of (1) a central pith, (2) a vascular cylinder or stele, (3) a zone but slightly carbonized and containing a few leaf traces, and (4) portions of a zone composed of highly carbonized structure and penetrated by many leaf traces.

MICROSCOPIC STRUCTURE.

The succession of parts noted above was obtained from the polished end of one of the stems. This was found necessary in consequence of the fact that in reducing slices to a condition of transparency, it was impossible to avoid the loss of external parts, so that of the four regions noted, only three appear in the microscopic preparation with any approach to completeness, the fourth and most external being represented by a small fragment only. (Plate I., fig. 2.)

The Pith.—The pith is prominent and 13 mm. broad in its greatest diameter. It consists of rather large, parenchyma cells in which localized groups often show a tendency to greater thickening of the walls. These groups of sclerenchyma are dark in colour, but devoid of starch. There is a general absence of starch in the medulla proper, except in the region bordering upon the stele and in certain radial extensions which lie between the folds of the horseshoe-shaped xylem bundles. These projections, when narrow, are composed of thin-walled parenchyma cells which show remnants of nuclei, but they are devoid of starch. When broad, they commonly enlarge toward the free end. (Plate II., fig. 3.) The border cells are then seen to be thin walled, usually with nuclei, and devoid of starch; but the cells of the central region are conspicuously thicker walled and filled with large starch grains which are more or less completely carbonized, and thus impart to such structures a very dark appearance which is most conspicuous. (Plate II., fig. 3.)

The Medullary Rays.—The medullary rays are very variable in width. In the narrower ones, the structure has been pretty completely obliterated. In the broader rays, the cells bordering upon the xylem are thin walled and contain nuclei, but they show no evidence of starch. The central region of such rays consists of rather thick-walled cells filled with starch. Outwardly the rays spread out laterally along the face of each of the xylem bundles (Plate II., fig. 4) in such a way as to connect with the inner phloem between the xylem and the sieve cells.

The Stele.— The stele is conspicuous, and it is made up of about twenty-six bundles of the collateral type. It has an external diameter of 19 mm. and an average thickness of 3 mm.

The xylem bundles are conspicuous for their peculiarly curved or horseshoe form (Plate II., fig. 3), a feature which at once suggests comparison with Osmunda, in which similar bundles are a well-known and characteristic feature. The xylem elements consist of broad vessels of considerably greater diameter than in Osmunda Claytoniana or O. cinnamomea, and they are more nearly comparable with those of Todea barbara. The wall, at a point midway of its width, generally shows a constriction (Plate III., fig. 6) where the opposing plates are joined laterally and vertically. Between this point and the lateral limits of the wall, the two plates are split away so as to leave a narrow slit-like opening in the median plane, such as may be observed in Osmunda and more conspicuously in Todea. In longitudinal section the vessels are seen to be of the scalariform type common in ferns (Plate III., fig. 5), and identical with those which occur in Osmunda.

Immediately external to the xylem, the phloem consists of several rows of medium sized, thin-walled cells containing conspicuous nuclei, but devoid of starch. In longitudinal section these cells are found to be short cylindrical, and the nuclei become much more prominent. (Plate III., fig. 5.) This tissue is succeeded by a layer of large, rather thick-walled sieve cells of very regular form, but variable in size and shape, often exceeding the largest xylem element. (Plate II., fig. 4.) Opposite the terminations of the rays, this zone broadens out radially and projects into the ray like a blunt wedge, after the manner described by De Bary for Osmunda.[1] (Plate II., fig. 4, and Plate VI., fig. 11).

External to the sieve cells, the phloem again becomes very thin walled, the cells contain prominent nuclei, are devoid of starch and are radially narrow, being tangentially elongated (Plate IV., fig. 7) in a manner quite similar to what occurs in Todea (Plate VI., fig. 12), and much more so than in either of the Osmundas studied. (Plate VI., fig. 11.)

The Endodermis.—The transition from the outer phloem to the surrounding parenchyma zone, occurs without any abrupt transition other than that which appears in the passage from radially narrower to radially broader cells. (Plate IV., fig. 7.) In other words, there is no separate and well defined endodermal layer such as occurs in Osmunda regalis and other ferns (Plate VI., fig. 11), but the transition is in all respects comparable with that which may be observed in Todea barbara. (Plate VI., fig. 12.)

Parenchyma zone or inner cortex.—Immediately external to the stele is a zone about 3 mm. thick, and thus with an external diameter of about 25 mm. (Plate I., fig. 2.) It probably represents a colourless tissue, and consists of rather large, thin-walled elements (Plate IV., fig. 7), in many of which starch may be seen—quite enough to indicate that the tissue as a whole was filled with this material as in Osmunda. The starch appears in the form of large grains somewhat highly carbonized, and in the figures (Plate II., fig. 3 and Plate IV., fig. 7) it gives a dark colour to the individual cells. The tissue as a whole presents but little alteration, and from the comparatively small amount of carbon present, it was evidently a tissue presenting but little, if any, modification in the original plant. An exactly similar and equivalent zone is met with both in Todea and in the Osmundas (Plate VI., fig. 11), and in the latter particularly the entire structure is filled with starch.

This region is traversed by few leaf traces (Plate I., fig. 2), since it is into this part of the stem that they are first given off from the outer face of the stele with a divergence probably somewhat in excess of 10°. They all have the form of a rather flat crescent (Plate IV., fig. 8), the parenchyma lying between the two arms being filled with starch.

---

[1] Comp. Anat. of Phan. & Ferns, 347.

The second zone external to the stele consists of a very highly carbonized, dense and opaque mass through which the more transparent and numerous leaf traces pass. (Plate I., fig. 1) and fig. 1. The material of this zone is very readily removed by mechanical manipulation, and even in the original specimens, only a comparatively small portion remains, while in the sections prepared for the microscope, only small fragments are preserved. (Plate I., fig. 2.) The highly carbonized character of the structure indicates that the original tissue must have been thick walled and of a modification containing a relatively high percentage of carbon. It would, therefore, be comparable in this respect, as well as in position, with the sclerenchymatized outer cortical zone so well defined in Todea and Osmunda. (fig. 2.) No definite

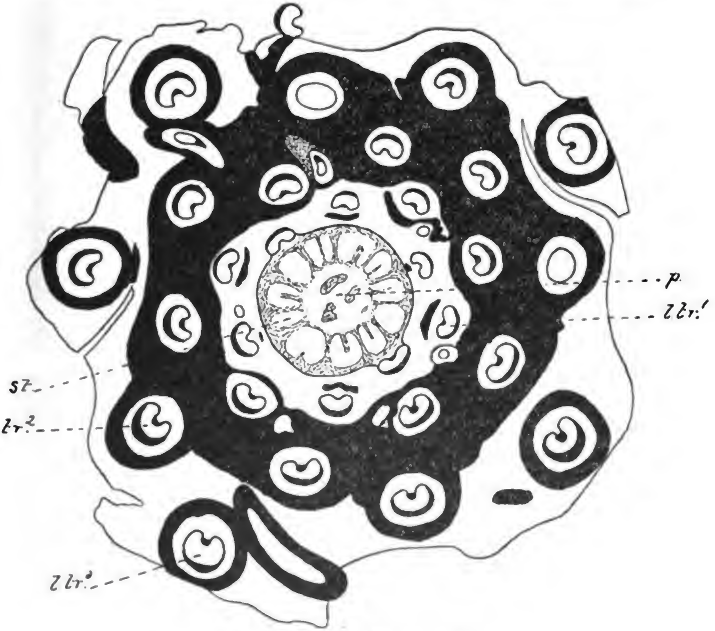


FIG. 2.—OSMUNDA REGALIS. x 10.

limits can be assigned to the volume of this zone, but it is probable that it must have been at least 1 cm. thick. The numerous leaf traces which traverse this region are now found to be much larger (fig. 1) than in the preceding zone, and to be more highly organized, partaking more of the character of the future stipes into which they lead than of simple leaf traces.

Leaves.—Among the material submitted to me were fragments of several leaves and a few casts of an uncertain character. Among them all there were only two fragments which could, with any degree of certainty, be regarded as having connection with the stems. From their general aspect it was assumed, provisionally, that they might represent the fronds of a fern of the type of Osmunda, in which case they must be held to be fragments of pinnæ of a doubly pinnate frond comparable with the fronds of Osmunda Claytoniana or O. cinnamomea. The largest and most perfectly preserved (figure 3) was found to be 8 cm. long by 5·5 cm. wide at its greatest breadth. The pinnules are oblong, slightly scythe shaped, obtuse, and with entire (?) margins; they are 8 mm. broad at the base and 2·5 cm. long, and there seems to be a possibility that they were confluent at the base, as in Osmunda Claytoniana. The whole specimen shows portions of fourteen pinnules only, while the rachis has been completely obliterated. The dimensions as given would show a rachis upwards of 5 mm. wide, which is

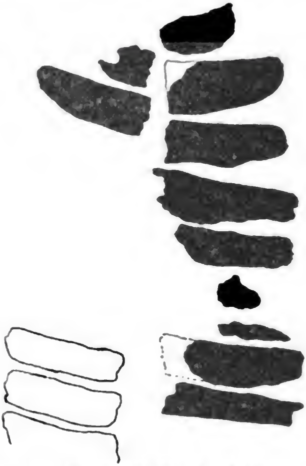


FIG. 3.—OSMUNDITES SKIDEGATENSIS. x $^1/_1$

probably much in excess of the real breadth of the original structure. This may possibly be explained by a separation of the pinnules under the influence of decay and pressure, or it may represent the confluent bases of the pinnules, which have disappeared. Unfortunately, the alteration of structure in these fragments has been carried to an extreme limit. Of the fourteen pinnules represented, three are mere impressions faintly defined. The others are impressions together with a very slight amount of carbonaceous matter, but in all cases all evidence of venation has been completely obliterated. It is, therefore, quite impossible to determine with any degree of accuracy what fern these casts represent. Nevertheless, a close comparison serves to show a certain resemblance to the fronds of Osmunda, and particularly to those of O. Claytoniana. Unfortunately, no final conclusions can be based upon these fragments of fronds, although there seems some ground for the belief that they may represent the foliage of the stems associated with them, and this may be adopted as a provisional view. If this should eventually prove to be a correct interpretation of their character, then they would prove that the fronds of the fossil were fully twice as large as those belonging to the modern Osmunda Claytoniana.

OSMUNDA.

The entire external aspect of the fossil stems served to suggest their relation to the modern Osmundas, and upon close comparison with O. regalis as the most readily available species, it was found that not only in the various external characters, but also in the internal structure and arrangement of parts, the characteristics already described for the fossil, are very clearly duplicated. Upon subsequently looking up the literature of the subject, I was much interested to note that O. regalis was the one species which had at various times been selected by previous investigators as the basis of comparison.[1]

For purposes of comparison, several characteristic rhizomes of O. regalis were gathered. These were found to occupy a horizontal position in growth, the upper extremity in the region of the terminal bud being somewhat ascending, and the stipes all turned into a vertical position. The rhizomes branch dichotomously, the whole spreading over an area of considerable extent. Each branch at its base is of minimum size, enlarging upward until a certain length has been attained, when the diameter becomes nearly uniform. Thus in one of the most characteristic of the rhizomes (Plate V., fig. 9) the total length was 23 cm., while the greatest breadth was 5 cm., this diameter being reached from a narrow base enlarging upward. The stumps of the old stipes are seen to overlap laterally to a limited extent, while the older overlie the more recently formed in such a manner as to explain the upward enlargement. It is also seen that the stipes arise chiefly from the under side of the rhizome[1] (Plate V., fig. 9 shows this aspect), from which position they turn upward. On the upper side of the rhizome the roots have a diameter upwards of 1 × 2 mm., slightly smaller than in the fossil. These organs are very numerous, and form an extensive mass which serves to completely conceal the stumps of the stipes arising from the same side of the rhizome. This distribution of roots and leaves is exactly represented in the fossil, from which it is possible to determine the position of the latter in growth, and to distinguish the superior from the inferior surface. The stipes are given off from the under side of the principal axis at an angle of 15°, and from the upper side at an angle of 28°. In O. cinnamomea, on the other hand, the angle is much less—ten degrees—and the same for both sides. A further examination of O. regalis shows that, taking the divergence of the stipes from a median line drawn on the under surface of the rhizome, the average is 15°, which is just that obtained from the longitudinal section. From this it may be inferred that the divergence of the stipes in the fossil as measured on the surface, is the same as would appear in longitudinal section, and therefore, the external angle of 10° as obtained is the true angle of divergence from the central axis. This being admitted, it then appears that in this respect, the fossil approaches O. cinnamomea much more nearly than O. regalis.

---

[1] Carruthers, Quart. Jrnl. Geol. Soc., XXV., 349, 1870. Goeppert, Die, Foss. Flora der perm. Form., XII., 1864-65.

A transverse section of the rhizome (fig. 2) shows (1) a conspicuous pith, (2) the stele, (3) a parenchymatous zone penetrated by few leaf traces and corresponding to the third region in the fossil, (4) a broad zone of sclerenchyma penetrated by many leaf traces, and represented in the fossil by portions of a highly carbonized zone, (5) a region where the stipes are loosely held together by soft tissue—a region not represented in fig. 2, but appearing in two of the fossil specimens in the form of carbonized surface areas of limited extent.

The Pith.—The pith is about 1 mm. broad. This is approximately the same as in O. cinnamomea (1·25 mm.), but only one-thirteenth the diameter of the same structure in the fossil, from which inferences may be drawn respecting the relative dimensions of these plants. The cells are rather large and thin-walled, and are very commonly found to contain an abundance of starch. Within limited areas, the cells are thick-walled, thus forming groups of dark coloured sclerenchyma.

---

[1] The eccentricity of the central axis of Osmunda relative to the external portions of the rhizome, has been incorrectly interpreted by Carruthers as due to unequal wearing of the parts. (Quart. Jrnl. Geol. Soc., 1870, 349.)

Radial extensions of the pith project into the stele between the arms of the curved xylem bundles. These consist of thin-walled elements with prominent nuclei but no starch, all along the region of contact with the xylem; but in the larger of these projections, which then enlarge towards the free end, the central cells become thicker-walled and contain an abundance of starch exactly as in the fossil.

The Medullary Rays.—The rays consist of thin-walled elements with prominent nuclei but no starch, except where unusually broad. Then the central cells become thick-walled and are filled with starch. Outwardly they spread right and left along the outer face of the xylem, lying between it and the sieve cells, and thus connecting with the inner phloem. (Plate VI., fig. 11.)

The Stele.—The stele has an average thickness of 0·75 mm. and an extreme external diameter of 2·5 mm.[1] In O. cinnamomea these dimensions are somewhat larger, the external diameter being 3 mm. In the fossil it has been found that the stele has an average thickness of 3 mm. and an external diameter of 19 mm., from which it appears that it has a diameter 7·06 times greater than in O. regalis, and an average thickness about four times greater. From this an inference may be drawn as to the relative dimensions of the two plants. The observation that the rhizome of Todea barbara, with an external diameter of 11·5 cm., and therefore more than twice the diameter of O. regalis, nevertheless has a stele only slightly larger, and of the same size (3 mm.) as in O. cinnamomea, appeared at first to indicate that relative dimensions cannot be established by comparison of the steles. But when it is recalled that the much greater angle at which the stipes are given off in Todea offers a complete explanation of the greater external dimensions, and that both O. cinnamomea and the fossil are essentially the same with respect to the divergence of the leaves from the central axis, as well as in the dimensions of the stele, it will be found that the latter offers a fairly safe basis upon which to estimate differences in size of the plant as a whole. From this, therefore, it is fair to assume that the fossil under consideration was about seven times larger than O. regalis, and this view is also borne out in part by the supposed foliage.

The xylem bundles have the horseshoe shape so well known in this genus, and are about 11 in number. The elements are much narrower than in the fossil and somewhat broader than in O. cinnamomea. (Plate V., fig. 10.) In both O. regalis and O. cinnamomea, they also show the structural features described for the fossil, and this very close resemblance is fully borne out in longitudinal section.

---

[1] This does not agree with De Bary's statement that the stele is 6 mm. thick. (Comp. Anat. of Phan. & Ferns, p. 279.)

The phloem on its inner face consists of several rows of thin-walled elements which contain very prominent nuclei. (Plate VI., fig. 11.) This tissue is succeeded by a well-defined layer of sieve cells which are rather thick-walled and remarkable, not only for their radial compression, but also for the contortion of the walls, features which are also found in O. cinnamomea, and, to less marked extent, in Todea, but do not appear in the fossil. (Plate VI., figs. 11 and 12.) Opposite the medullary rays the sieve cell tissue broadens radially to form blunt, wedge-shaped masses which project into the ends of the rays after the manner described by De Bary.[1] (Plate VI., fig. 11.) The outer phloem consists of several rows of thin-walled elements containing prominent nuclei. They are somewhat elongated tangentially (Plate VI., fig. 11), but probably not to the extent to be inferred from De Bary's statement.[2]

Endodermis.—In Osmunda regalis there is a well-defined endodermal layer which is also present in O. cinnamomea, but lacking in the fossil. It consists of a layer of dark coloured cells which lie in one or two rows, or locally of three or four rows. The cells are hexagonal and elongated tangentially, but not infrequently they assume a distinctly oval form and become somewhat thicker walled. (Plate VI., fig. 11.)

Parenchyma Zone.—Immediately external to the endodermis is a broad zone of parenchyma having a thickness of about 1 mm., and an external diameter of 4·5 mm., constituting the inner cortex. In O. cinnamomea these dimensions are somewhat greater, being 1·25 mm. and 5·5 mm. respectively. (Fig. 2.) The tissue throughout is colourless. The cells are rather large and thin-walled. They contain very prominent nuclei and are always filled with starch. (Plate VI., fig. 11.) This region is traversed by few leaf traces, which are in the form of an open crescent, and in this respect it approaches the type found in the fossil much more nearly than does O. cinnamomea. This region is exactly represented in the fossil by the third region described. (Plate I., fig. 2.)

Sclerenchyma Zone.—Following the parenchyma is a dense, dark coloured zone of sclerenchyma forming the external cortical region of the stem proper. (Fig. 2.) This zone is represented in the fossil by remnants only (Fig. 1), and in the microscopical preparation, only very small fragments appear (Plate I., fig. 2.) While in the fossil the limits of this zone cannot be determined, its relative volume may be inferred by comparison with Osmunda. In O. regalis it has a thickness of about 2 mm. and an external diameter of 8·5 mm., while in O. cinnamomea, with about the same average thickness, it has an external diameter of 9 mm. If, then, the same ratio obtains for this as for the other parts, this zone in the fossil must have had an external diameter not far from 64 mm.

---

[1] Comp. Anat. of Phan. & Ferns, 347.

[2] Comp. Anat. of Phan. & Ferns, 347.

The cells of this tissue are rounded, rather small, and thick-walled. The region is traversed by numerous leaf traces which now partake more fully of the organization of the future stipe. By comparison with the fossil, it is possible to understand the highly carbonaceous character which this region presents in the latter.

TODEA BARBARA.

The large external diameter of the stems of Todea barbara suggested the expediency of a comparison with it In this plant the short upright stems are about 24 cm. long and 11·5 cm. broad. They are joined into a massive trunk nearly three feet in diameter and about the same height. A transverse section discloses the fact that the external dimensions bear no relation to the size of the central axis or stem proper, and therefore in that respect it fails to throw light upon the character of the fossil. From what may be regarded as equivalent to the upper side of the rhizome in Osmunda, the stipes diverge from the stem at an angle of 20°, while from the opposite side—that which is outermost in relation to the whole trunk—they show a divergence of 35°, this angle being greatly increased toward the outer limits of the stem by a continually increasing curvature. It will thus be seen that this divergence is at least twice as great as in the fossil, twice as great as in Osmunda cinnamomea, and one-fourth greater than in O. regalis. This seems to explain the marked differences of external dimensions where the central axis is approximately the same.

The Pith.—The pith has an external diameter of 1·5 mm. It shows but few radial extensions into the xylem of the stele.

Medullary Rays.—The medullary rays are few in number, but they present essentially the same features as in Osmunda.

The Stele.—The stele is composed of a few broad vascular bundles.[1] The xylem only occasionally exhibits the horseshoe form so well defined in Osmunda. The phloem shows essentially the same features as in Osmunda, except that the outer layer in the endodermal region consists of very much elongated (tangentially) cells, in this respect differing materially from Osmunda and closely approaching the type exhibited in the fossil. (Plate VI., fig. 12.) The stele as a whole has an outside diameter of 3 mm., with an average thickness of 0·75 mm. It is therefore closely comparable with the two species of Osmunda already described.

---

[1] De Bary, Comp. Anat. of Phan. & Ferns, 347.

The Endodermis.—There is no clearly differentiated endodermal layer as in Osmunda. (Plate VI., fig. 12.) The radially flattened cells of the outer phloem are immediately adjacent to the zone of starch-bearing parenchyma.[1] This latter (Plate VI., fig. 12) is made up of large, thin-walled cells containing comparatively little starch, which may possibly be explained by the unusual thickening of the stipes, the fleshy bases of which form a compact zone of considerable width immediately external to the sclerenchyma, and thus make up the chief portion of the stem. The parenchyma zone is only 7 mm. in outside diameter, and it is traversed by few leaf traces.

The sclerenchyma zone has an extreme external diameter of 2 cm., and it is thus much more voluminous than in Osmunda, but far less so than in the fossil.

From the facts thus set forth, the following general conclusions may be drawn:—

1st. The fossil represents a plant of the general external aspect and habit of growth of Osmunda regalis.

2nd. In size it was much greater than any of the three species of Osmunda common to this latitude, and probably about seven times larger than O. regalis.

3rd. In its internal structure it approaches Osmunda on the one hand and Todea on the other.

4th. In the absence of foliage and fructification, no precise connection with one or the other of these genera can be established.

5th. The evidence now at hand seems to indicate a closer affinity with Osmunda than with Todea.

In view of these conclusions, it would seem most expedient to refer this plant to the genus Osmundites, and to assign it a specific name indicative of the locality, for which O. skidegatensis seems appropriate.

At the present time but few species of Osmundites are known. Two of these are European, and their determination is based upon the stem structure, while of the four North American species, the three hitherto described are based upon the foliage only. *Astrochlæna schemniciensis* of Pettko, which Unger later referred to Osmundites, was derived from the Tertiary of Schemnitz in Hungary.[2] I have not been able to compare the present specimen with it.

Osmundites dowkeri of Carruthers[3] was obtained from the Lower Eocene of Home Bay, England. It is described as much larger than Osmunda regalis, and in this respect may be regarded as representing a type similar to that of O. skidegatensis. It is also of interest to note hat similarly there is evidence of an abundant starch deposit in the arenchyma tissue of the inner cortex. The figures and description, owever, are very unsatisfactory, inasmuch as they do not supply the etails necessary for a close comparison, and in the absence of actual xamination of the original specimens, it is not possible to establish more han a generic resemblance.

---

[1] De Bary, Comp. Anat. of Phan. & Ferns, 347.

[2] Solms-Laubach, Fossil Botany, 172.

[3] Quart. Jrnl. Geol. Soc., 1870, 349.

The several species of Osmundites (Osmunda) occurring in North merica[1] are known only by their foliage and fruit, so that no comparion can be made with them at the present time. It is, nevertheless, of nterest to note that these plants were not only common in Tertiary ime,[2] but that they also appear to have been abundant at a somewhat arlier period than the Lower Cretaceous,[3] and the plant which is now ound in the Lower Cretaceous of Queen Charlotte Islands is, in all robability, closely similar to those occurring in the Potomac formation f Virginia. It is, however, clear, from the preceding considerations, hat our present knowledge of these plants will not admit of establishing pecific relations between the present fossil and those previously recorded.

With respect to the relations of O. skidegatensis to existing species in the same region, nothing can be said, since the genus Osmunda has completely disappeared from that locality,[4] and at the present time it does not extend farther west than Manitoba.[5]

---

[1] For a full list of these plants and bibliography, see Knowlton's Catague of Cretaceous and Tertiary Plants of North America. (Bull. U.S. Geol. urv., No. 152, p. 154.)

[2] U.S. Geol. Surv., Tertiary Flora, 60.

[3] U.S. Geol. Survey, Potomac Flora, 146, etc.

[4] Geol. Surv. of Canada, 1878-79, 222B.

[5] Cat. of Canadian Plants (Macoun), 286.

ILLUSTRATIONS.

PLATES I-VI.

Fig. 1.—Rhizome of Osmundites skidegatensis. x $^1/_1$.

Fig. 2.—Osmundites skidegatensis. Sectional view showing (l. tr.) leaf traces. x 3.

Fig. 3.—.. .. .. A portion of the stele, showing (1) pith, (2) the horseshoe-shaped xylem bundles enclosing starch-bearing extensions of the pith, (3) medullary rays, (4) the phloem, (5) starch-bearing parenchyma external to the stele. x 20.

Fig. 4.—.. .. .. Section showing (1) the outer face of the xylem, (2) a medullary ray at the point of emergence and junction with the inner phloem, (3) the sieve tissue showing the wedge-shaped expansion, (4) the elongated cells of the outer phloem. x 200.

Fig. 5.—.. .. .. Tangential section showing (1) scalariform elements of the xylem, (2) thin-walled elements of the inner phloem containing nuclei. x 200.

Fig. 6.—.. .. .. Transverse section of the xylem. x 200.

Fig. 7.—.. .. .. Transverse section showing (1) the elongated cells of the outer phloem, (2) the absence of a definite endodermal layer, (3) the cells of the parenchyma zone-bearing starch. x 200.

Fig. 8.—.. .. .. Section of a leaf trace showing parenchyma cells containing starch. x 55.

Fig. 9.—Osmunda regalis. View of a rhizome from the underside, showing the overlapping stipes and the upward enlargement of the base. x $^1/_3$.

Fig. 10.—.. .. .. Section through the xylem. x 200.

Fig. 11.—.. .. .. Section showing (mr.) the medullary ray and its junction with the inner phloem, (x.) the xylem, (ph.^{1}) the inner phloem, (s.c) sieve cells with the wedge-shaped expansion of the tissue opposite the ray, (ph.^{2}) the outer phloem, (en.) the endodermis, (pr.) the outer zone of parenchyma with prominent nuclei and starch. x 183.

Fig. 12.—Todea barbara. Section showing (x.) the xylem, (mr.) a medullary ray at its junction with the inner phloem, (s.c.) sieve cells showing their radial expansion into a wedge-shaped mass opposite the ray, (ph.) inner and outer phloem, the latter showing much elongated cells, (pr.) the outer zone of parenchyma. x 183.

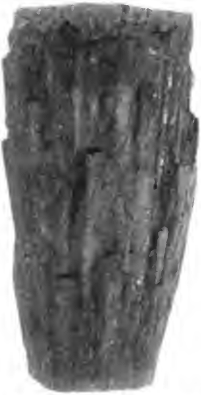


FIG. 1.—OSMUNDITES SKIDEGATENSIS. x $^1/_1$.

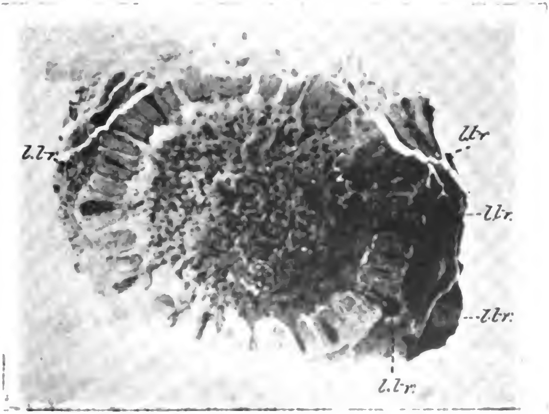


PLATE I. FIG. 2.—OSMUNDITES SKIDEGATENSIS. x 3.

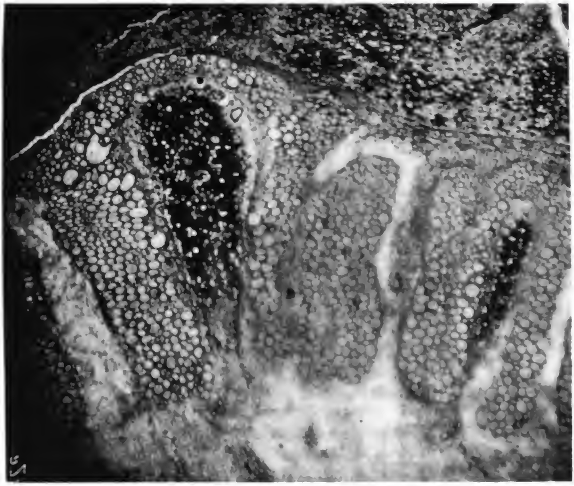


FIG. 3.—OSMUNDITES SKIDEGATENSIS. x 20.

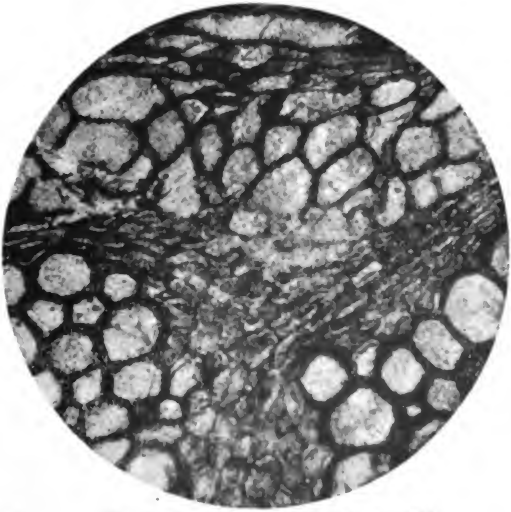


PLATE II. FIG. 4.—OSMUNDITES SKIDEGATENSIS. x 200.

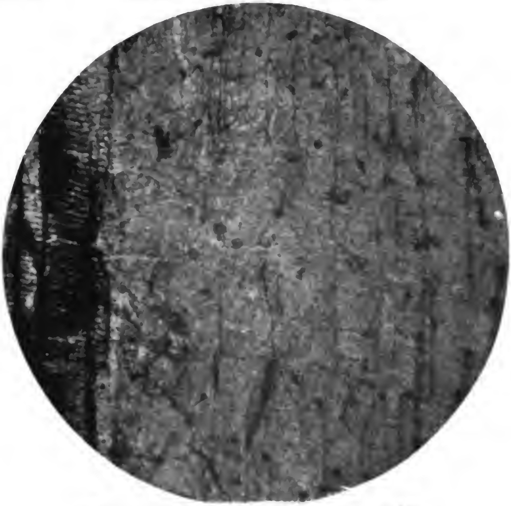


FIG. 5.—OSMUNDITES SKIDEGATENSIS. x 200.

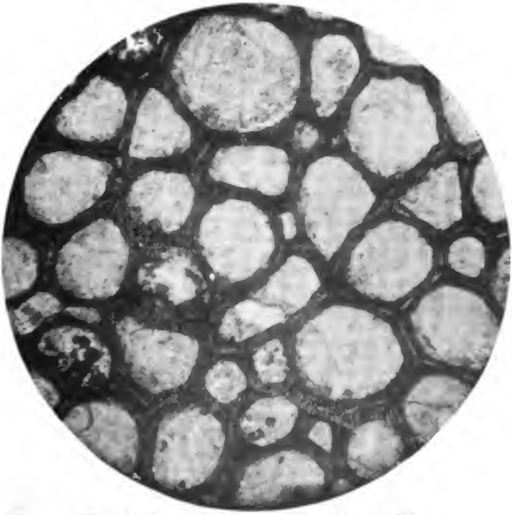


PLATE III. FIG. 6.—OSMUNDITES SKIDEGATENSIS. x 200.

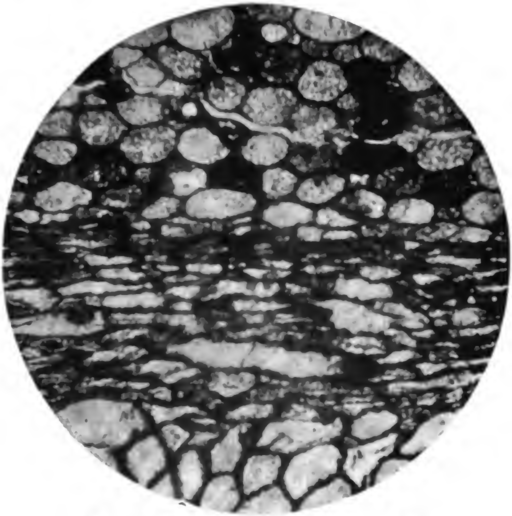


FIG. 7.—OSMUNDITES SKIDEGATENSIS. x 200.

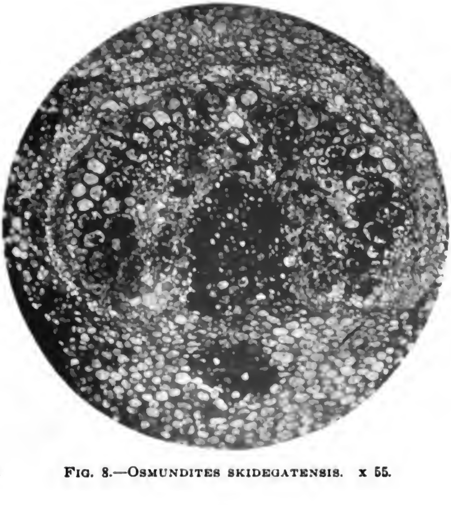


PLATE IV.

FIG. 8.—OSMUNDITES SKIDEGATENSIS. x 55.

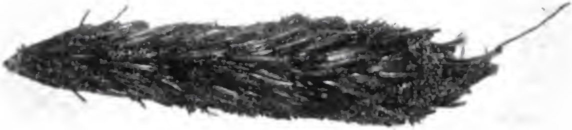


FIG. 9.—OSMUNDA REGALIS. x $^1/_2$.

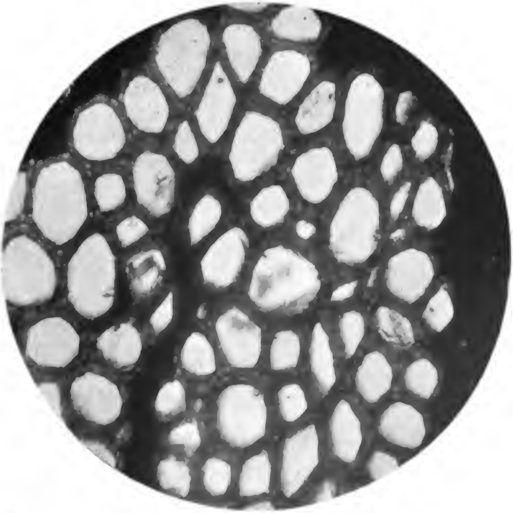


PLATE V.

FIG. 10.—OSMUNDA REGALIS. x 200.

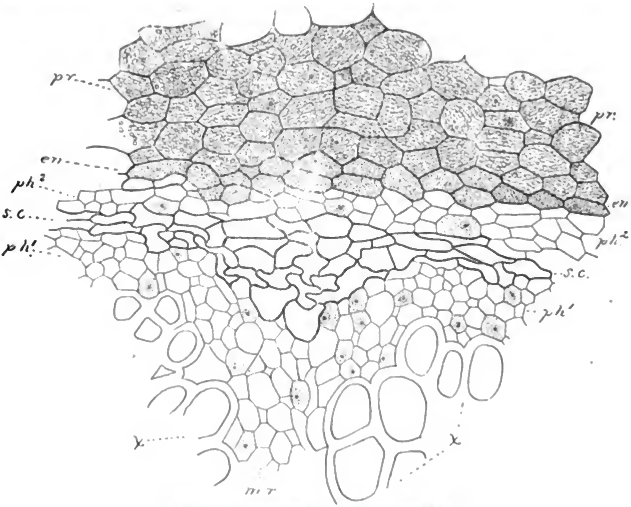


FIG. 11.—OSMUNDA REGALIS. x 183.

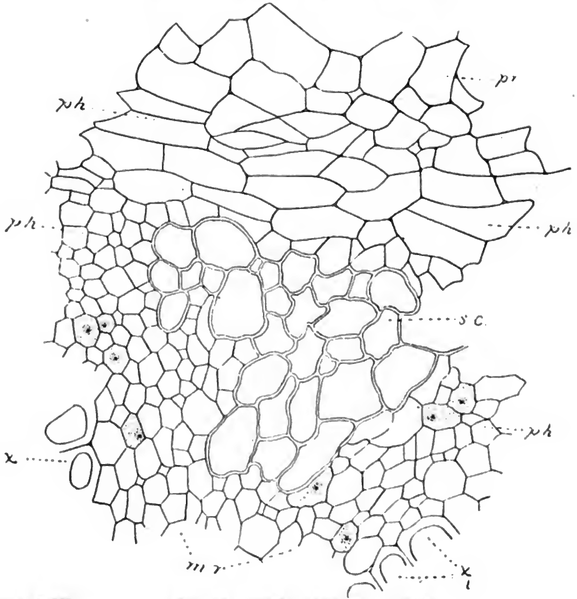


PLATE VI. FIG. 12.—TODEA BARBARA. x 183.

II.— *Notes on Cretaceous and Tertiary Plants of Canada.*

By D. P. PENHALLOW.

(Read May 27, 1902.)

Plates VII.— XVI.

Among the large amount of fossil plant material brought together by Sir William Dawson, were several collections from the west coast, from the Queen Charlotte and other Islands and from the interior of British Columbia and the Northwest Territories. Some of this material had been submitted to a preliminary study, but the greater portion had not been examined at all before his death. In looking over the fossil plants in the Redpath Museum with a view to making the determined species available in the collections, my attention was directed to this material as likely to afford some additional facts relative to the vegetation of the formations from which it was derived, and arrangements were accordingly made to proceed with its study without unnecessary delay. Three of these collections form the subject of the present paper, and they were derived from

1. Vancouver and the Queen Charlotte Islands.
2. The Red Deer River, N.W.T.
3. The Horse-Fly River, British Columbia.

VANCOUVER AND QUEEN CHARLOTTE ISLANDS.

The plants comprised in the collection from the Queen Charlotte Islands and from Vancouver Island, are recorded as collected by Dr. F. C. Newcombe in 1895. There were in all, fifty-three specimens, but the total number of species represented, proved not to exceed eighteen. Of these three are probably new, one is of uncertain specific identity, and the remainder represent previously described and well-known types. In two instances it has been possible to connect specimens of wood with the foliage of the same species, hitherto known only through their leaves and fruit, while in a third case, a petiole and a portion of a fertile frond, have extended our previous knowledge of a plant which had been recognized by its stem alone. The present studies of this group, therefore, may be held to possess special interest and value as contributing to a definite and accurate knowledge of types occupying a position of special prominence in the formations to which they belong.

OSMUNDITES SKIDEGATENSIS, Penh.

Plates VII.— XI.

Lower Cretaceous of Maud Island and Skidegate Inlet, Queen Charlotte Islands.

Among the material from Maud Island was an imperfectly preserved fragment of a frond representing a portion of a pinna 2 cm. long. On the central rachis which was conspicuous, there were portions of five pairs of pinnules, so that the entire pinna had a width of 1 cm. The pinnules are oblong, obtuse (?), entire and with a somewhat distinct midrib from which the apparently forking veins diverge at a conspicuous angle. The pinnules make an angle of about 40 deg. with the rachis, and they present a width of 3·5 mm. Two of them show depressions extending from the midvein to the margin, of such form and character as to immediately suggest the soral areas of Osmunda, and more particularly of Todea. No further evidence of the fruit appears, however, as all of the sporangia, if originally present, have completely disappeared. The depressions are of sufficient number and their relations to the general structure are of such a nature as to eliminate the idea of "accidental features." They diverge from the midvein parallel to the veins, and they extend from the midvein to the margin. In one or two cases they were found to exactly correspond to the slight lobing of the pinnule—one depression to each lobe. If these features are connected with the development of the fruit, it then becomes obvious that the sori must have been oblong, and placed in two series laterally to the midrib. Bringing these features into comparison with what may be found among existing types, they are obviously representative of the Osmundaceae, and perhaps most suggestive in some respects of the genus Todea, while in others they suggest Osmunda. But no existing Todeas have fronds exhibiting such diminutive segments as are here represented, so that the specimen is no doubt to be regarded as representing the fertile frond of an Osmunda of the type of O. claytoniana.

In immediate association with the frond there was found a small fragment of a stem measuring 5 mm. in diameter and 13 mm. in length. This specimen was perfectly terete and showed neither surface markings nor carbonized residue indicative of cortex. The transverse fracture gave no indication of structure beyond a circular zone near the central portion, suggestive of a vascular axis or stele. Although not in absolute connection with the frond, the very intimate association of the two—the one overlying the other within a space of less than 1 cm. at the point of greatest separation, and at an angle which seemed to show that in the original matrix the two must have been in contact, if not actually joined — served to lend weight to the idea that the two fragments were in reality parts of the same plant, and that the stem-like body was therefore a portion of a fern stipe or rachis. From the very small amount of material available, transverse and longitudinal sections were cut, and these proved to be most successful in exposing the most important parts of the structure. It was then seen beyond all doubt, that the specimen represented the stipe of a fern in a most excellent state of preservation, and from it the following details have been obtained.

Transverse.— (Plate VII., fig. 1). The epidermal system has been completely removed. The outer cortex consists of rather small rounded sclerenchyma cells (Plate VII., fig. 2), the walls of which are not very strongly thickened. This tissue passes gradually into the structure of the inner cortex (Plate VIII., fig. 3) which is composed of rather large and thin-walled elements, among which are a number of much broader, prominent mucilage cells. The tissue as a whole has been much altered and broken by decay. The stele is of crescentic form (Plate VII., fig. 1, and Plate IX., fig. 5), and it is thus directly comparable with the corresponding structure in the Osmundaceæ (Plate VIII., fig. 4). the free ends being incurved in each case. The endodermis shows no structural details. The vascular bundle is of the collateral type as in the Osmundaceæ. The phloem lies on the dorsal side (Plate IX., fig. 5), but the structure has been largely removed by decay and only that portion in immediate contact with the xylem — the phloem proper — (Plate IX., fig. 6) has been preserved, but in such condition that the details cannot be determined. Within this region there are a number of rounded bodies which stand out from the general margins of the adjacent parts, and these represent globules of mucilage precisely as found in any existing Osmunda, and as is also prominent in Todea. (Plate VIII., fig. 4, and Plate X., fig. 7.)

The central parenchyma on the ventral side of the stele, consists of small, thick-walled elements containing an abundance of protoplasmic material, but that portion which immediately abuts upon the protoxylem has been removed by decay so as to develop a structureless zone of considerable width. (Plate IX., fig. 6.) There is therefore evidence which tends to show the structure of this region to have been thin-walled parenchyma as in Todea (Plate X., fig. 7), and this resemblance is further heightened by the occurrence here of an abundance of mucilage globules which, in situation and number, as well as in frequency of occurrence, closely duplicate similar features in Todea. (Plate VIII., fig. 4.)

The protoxylem is well preserved, and it appears as a well defined layer on the ventral side of the stele. (Plate IX., fig. 6.) The elements are narrow and rather thin-walled, and they form a layer of very unequal thickness. The secondary xylem is represented by broad, not very thick-walled elements which lie within a single row. (Plate IX., fig. 6.)

Longitudinal. (Plate X., fig. 8.) The longitudinal section was most fortunate, cutting through the stele in the dorsal half so as to expose nearly all the component elements. This section also shows the epidermal tissue to be wholly wanting. The outer cortex consists of rather narrow, fibrous sclerenchyma cells which gradually diminish in length and increase in breadth until they pass into the structure of the inner cortex (Plate XI., fig. 9) where the elements are fusiform. The inner cortex terminates in a narrow zone of fibrous sclerenchyma elements, precisely as in Todea, and although the details of structure are not very clearly distinguishable, there seems little reason to doubt that this is the equivalent of the similar sheath in Todea, and that it represents the sclerenchymatous zone replacing the special endodermis, as so commonly occurs in the Osmundas. Within this sclerenchymatous sheath is the broad, vacant region formerly occupied by thin-walled parenchyma, and the great abundance of mucilage located here, now becomes much more apparent than in the transverse section. The mucilage zone is inwardly limited by the remnant of the phloem, and this is succeeded in turn by the xylem. The section appears to have cut through the xylem at such a point as to expose the inner edges of the scalariform vessels which appear to form the principal elements. (Plate XI., fig. 10) but at one point it traverses the protoxylem which is shown as very narrow tracheids with exceedingly close spirals, so as to resemble scalariform structure. The succession of tissues as exposed in the longitudinal section, is therefore as follows:—

1. Cortex.
    (*a*) Hypodermal, fibrous, narrow-celled sclerenchyma passing into
    (*b*) The inner cortex composed of large-celled, thin-walled, fusiform parenchyma with an abundance of mucilage cells.
2. The sclerenchymatous sheath replacing a special endodermis, and composed of slender, fibrous sclerenchyma as in Osmundas of recent times.
3. A broad zone of parenchyma from which the structure has been removed by decay—now occupied by globules of mucilage.

4. A narrow zone of phloem.
5. A single row of large, scalariform tracheids.
6. A narrow zone of protoxylem elements.
7. Small celled parenchyma of the central region filled with protoplasm, but with no starch.

In the xylem and other elements, the cell wall has been so far altered by decay that it is impossible to determine the specific structural features, and it is therefore impossible to establish the precise contact with Osmunda in this respect, but the features thus described indicate most clearly the general relation to the Osmundaceæ. Specifically the type differs from Osmunda and approaches Todea in the following respects:—

1. The broad zone of thin-walled parenchyma internal to the sheath.
2. The greater abundance of mucilage in large cells within the phloem and protoxylem regions.
3. The zone of thin-walled parenchyma in the protoxylem region.

It differs from the type of Todea and thereby approaches Osmunda in the following respects:—

1. The special form of the stele.
2. The occurrence of the secondary xylem in a single row.
3. The great excess of mucilage in the phloem region.
4. The great volume of the phloem parenchyma.
5. The greatly diminished size of the cells in the central parenchyma.

These relations are supported by the evidence afforded by the foliage and we cannot otherwise than conclude that the plant under consideration must have been a true Osmunda.

In 1898 a rhizome of an Osmunda from Alliford Bay, Skidegate Inlet, Queen Charlotte Islands, was described by me under the name of Osmundites skidegatensis.[1] There were also found certain fragments of foliage in all probability belonging to the same plant. Upon comparison with existing species, it was found that the material might be referred to the type presented in Osmunda claytoniana. The results of these studies are now published in connection with this paper. It is worthy of note that the two specimens from the same horizon, and essentially from the same locality, are both to be referred to Osmunda of the type of O. claytoniana, and there can be little reason to doubt that the two lots represent the same species. As we know it, the species is now represented by: —

---

[1] Trans. R. Soc. Can., VIII., iv., 3.

1. The complete structure of the rhizome.
2. The rather complete structure of the stipe.
3. The foliage.
4. The fertile pinnules devoid of sporangia.

CTENOPTERIS COLUMBIENSIS, n. sp.

Upper Cretaceous of Port McNeil, Vancouver Island.

This species is represented by a small fragment of a frond from Port McNeil, Vancouver Island, and it embraces only three pinnules. The oblong pinnules ascend at an angle of 60 deg., and attain a dimension of 7 mm. in width by 13 mm. in length. The margins are entire, the apex rounded and the base slightly decurrent. The eight or nine veins are prominent and fork from near the base.

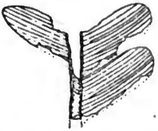


FIG. 1.—CTENOPTERIS COLUMBIENSIS.

NEUROPTERIS HETEROPHYLLA, Brongn.

Brongniart, Hist. des Veg. Foss., 1828, 243, LXXI. & LXXII.

Lower Cretaceous of Alliford Bay, Queen Charlotte Islands.

Three fragmentary specimens from Alliford Bay, Queen Charlotte Islands, represent the pinnæ of a fern showing the characteristic venation and forms of Brongniart's Neuropteris heterophylla from the coal measures of Europe, and from which it cannot well be separated, but in view of the very different horizons in which they occur, it would seem expedient to designate the Alliford Bay specimen as N. heterophylla cretacea. The only other species recorded from the same horizon in neighbouring localities, is N. castor of Dawson, derived from the Upper Cretaceous of Vancouver Island, but this differs in such conspicuous ways as to admit of no difficulty in separation.

TÆNIOPTERIS PLUMOSA, Dn.

Dawson, Trans. R. Soc. Can., I., iv., 24 (1883).

Lower Cretaceous of Alliford Bay, Q.C.I.; and Baynes' Sound, Vancouver Island.

One small fragment from Alliford Bay is evidently identical with Tæniopteris plumosa as described by Sir William Dawson from the Upper Cretaceous of Baynes' Sound.

TÆNIOPTERIS OROVILLENSIS, Fontaine.

Fontaine, Amer. Journ. Sc., Ser. 4, II. (1896), p. 274.
Ward, Mesozoic Flora of the U.S.
Ann. Rept. U.S. Geol. Surv., XX. (1898-1899), 384.

Jurassic (Lower Oolite) of Oroville, California; Upper Cretaceous of Port McNeil, Vancouver Island.

The material representing this species is from the Upper Cretaceous formation at Port McNeil, Vancouver Island. It consists of a fragment of a stipe and four fragments of fronds. The fragment of the stipe measures 38 mm. in length. The basal end is 9 mm. wide, and from this it gradually diminishes upward to a diameter of 5 mm. For a distance of 22 mm. from the basal end, the structure is intact and the surface shows fine, parallel striæ about 1 mm. distant. The upper 16 mm. of the specimen show one-half of the structure to have been removed, evidently in the splitting of the matrix, so as to expose a section in the median plane, and here a differentiation of structure is manifested in the occurrence of a lighter streak or longitudinal band which serves to suggest the exposure of one of the vascular bundles in section. The whole specimen has been much flattened by pressure, and it is in such a condition as to render sectioning inexpedient.

With one exception the leaf fragments show a strong midrib and more or less well defined venation. The apex is not represented, but the base is poorly shown in one instance. The frond enlarges upward gradually, from a narrow base to a width of 5·5 cm. In the largest specimen the length of the frond must have been about 20 cm. when complete. The margin is perfectly entire in all cases. The very strong midrib ranges in width from 2 mm. to 3 mm. in the largest specimen, and when well preserved it is strongly but finely rugose. The veins are strictly simple. They leave the midrib at an angle of very nearly 90 deg., or in one specimen, they show a more pronounced tendency to form a definite upward angle. They are extremely fine, numerous and closely packed, being exactly 3 to the millimetre. At the outer end, at a distance of about 7 mm. from the margin, they commence a slight upward curve which is maintained to the end.

An examination of the records of similar plants from the same or neighbouring localities, shows the occurrence of Macrotæniopteris vancouverensis, Dn., in the Upper Cretaceous of Nanaimo, Vancouver Island,[1] but this admits of no direct comparison with our specimens. Tæniopteris plumosa, Dn., was described in 1883 by Sir William Dawson as occurring in the Upper Cretaceous at Baynes' Sound, but the small size of the frond and the strongly developed upward angle (50 deg.) of the veins, at once excludes it from all comparison with the present forms.

Ward figures and describes various specimens of Tæniopteris orovillensis from the Oroville beds of California. The essential features of his description show the frond to be narrowly elliptical, tapering gradually toward both base and apex, and attaining a probable length of 26 cm. The midrib is strong, prominent and rounded, while the lateral veins which are given off nearly at right angles, are parallel throughout, fine, closely packed and 3 to the millimetre, while they also curve slightly upward toward the end of the frond. The figures given,[2] almost exactly duplicate one of our specimens. It will thus be seen that there is a very close correspondence between the plants from Port McNeil and those from the Oroville beds. Fontaine's original account of this species[3] gives nothing beyond the name and a discussion of the geological relations.

The genus Tæniopteris as a whole, belongs to the earlier rather than to the later Mesozoic time, and with the exception of T. plumosa which represents a diminutive form, there is no previous record of its occurrence above the Lower Cretaceous, while it is very conspicuous in the Jurassic and Triassic formations. Tæniopteris orovillensis as recorded by Fontaine and Ward, is very abundant in the Oroville beds which Prof. Fontaine finds to be of the age of the Lower Oolite,[4] although in a later statement, he shows that the age cannot be so exactly defined,[5] and that it may be anywhere between the Upper Trias and the Lower Oolite. The occurrence of the same species in the Upper Cretaceous may possibly be taken as indicating the limit of the geological range, and that it there represents the culminating form of the type in association with the obviously depauperate T. plumosa.

---

[1] Trans. R. Soc. Can., XI., iv., 55.

[2] Mesozoic Flora of the U.S., 384, Pl. LII., figs. 2-4.

[3] Amer. Journ. Sc., Ser. 4, II. (1896), 274.

[4] *Ibid*, 275.

[5] Mesozoic Flora of the U.S., XX., 341.

SAGENOPTERIS NILSONIANA (Brongn.), Ward.

Fontaine, The Older Mesozoic of Virginia. U.S. Geol. Surv., Mem. VI., 104, 1883.

Ward, The Mes. Flora of the U.S. U.S. Geol. Surv., Ann. Rept. XX., 352, 1898-99.

Schimper, Paléontologie Végétale, I., 642.

Brongniart, Hist. des Veg. Foss., I., 225, 1828.

Jurassic (Oroville Beds) of California; Lower Cretaceous of Queen Charlotte Islands (Maud Island and Alliford Bay).

The specimens in the Queen Charlotte Island collection were obtained from Maud Island and Alliford Bay. One specimen from Maud Island represented a partial pinnule with a perfect apex but no base. It measured 5 cm. in length and 3 cm. in width at its greatest expansion. In form it is narrowly obovate with a well defined and rounded apex, and an entire margin. The midvein is not obvious. The veins are quite prominent and appear as diverging lines, but there is no evidence of anastomosing. Except in point of size, the specimen compares very closely with Ward's figure of Sagenopteris nilsoniana[1] from the Oroville beds of California. Another nearly complete specimen measured 9 cm. by 4 cm. at its greatest width. A pronounced midvein extends from the base to within 3 cm. of the apex where it disappears. The characteristic anastomosing of the veins is clearly shown, as depicted by Fontaine,[2] while the specimen as a whole is that figured by Ward.[3]

The four smaller and less perfect specimens from Alliford Bay show the veins but no anastomosing.

In all of these specimens it is impossible to find any means of satisfactorily differentiating them from the Oroville material, and, as the mere element of size is of no great value in a species of such strongly polymorphic tendencies, I do not hesitate to refer them to Sagenopteris nilsoniana.

---

[1] Mesozoic Flora of the U.S., 352, Pl. LVI., 1; LVII., 2.

[2] Older Mesozoic of Virginia, Pl. XLIX., 5.

[3] Mesozoic Flora of the U.S., Pl. LXVII., 2.

SAGENOPTERIS OBLONGIFOLIA, n. sp.

Lower Cretaceous of Alliford Bay, Q.C.I.

An incomplete specimen from Alliford Bay shows all the characteristics of Sagenopteris, but of a type not hitherto described. The single pinna is 22 mm. broad, and in the complete state it was apparently about 5 cm. long. In outline it is regularly oblong-elliptical with a rounded base and possibly also a rounded apex, but in the absence of the upper portion, this can only be assumed from the general trend of the sides. The midrib is obscure except at the extreme base. The anastomosing of the venation is distinct, and the veins are divergent from near the base. The diagnosis of this species would be as follows: —

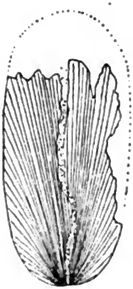


FIG. 2.—SAGENOPTERIS OBLONGIFOLIA.

Pinnæ regularly elliptical-oblong, about 5 cm. long and 22 mm. wide; the base rounded; midrib obscure except near the base; margin entire; the anastomosing venation divergent from near the base.

The elliptical form at once suggested the propriety of the name elliptica, but this was found to have been retained by Fontaine for another species from the Potomac Formation, distinguished by its oblong-lanceolate form. The present species may therefore be designated as S. oblongifolia.

SAGENOPTERIS ELLIPTICA, Fontaine.

Fontaine, Potomac Flora, 149, Pl. XXVII., figs. 9, 11, 17.

Lower Cretaceous of Alliford Bay, Q.C.I.; Potomac Formation of Potomac Run, Virginia, and Baltimore, Maryland.

Associated with Sagenopteris oblongifolia in the material from Alliford Bay, were two fragments of pinnæ — the one of the base and the other of the apex — which could not be separated from S. elliptica of Fontaine, as derived from the Potomac formation. This name seems somewhat unfortunate in that it fails to express the proper form of the pinna which is lanceolate rather than elliptical, with a tapering base.

CYCADITES, sp.—

The genus Cycadites is represented by a small fragment of a leaf with ten pinnæ, all of which have been broken off so as to represent but a portion of the original length. The rachis is prominent and the rather closely set, opposite pinnæ, are given off at angles ranging from 63 to 70 deg. The pinnæ are 1·75 mm. broad and broken off at lengths which range from 5-8 mm. Each has a fine but conspicuous central nerve. In some respects this plant suggests C. unjiga of Dawson[1] from the Cretaceous of Table Mountain, Pine River Forks and Peace River, after which latter locality it is named. In this latter species, however, the somewhat distant pinnæ diverge at an angle of 40-50 deg. A similar resemblance is also established with Lesquereux's C. pungens,[2] in which the pinnæ diverge at an angle of about 37 deg., and are somewhat more distant. The material is so fragmentary, and it is so obviously different from other known species, that while it should be definitely designated, it seems unwise to erect a new species upon such incomplete and scanty material. It is possible the fragment represents the immature foliage of one of the recognized species of the locality.

ZAMITES CRASSINERVIS, Fontaine.

Fontaine, Potomac Flora, 172, Pl. LXIX. & LXXXIII.

Potomac Formation of Fredericksburg, Va.; Lower Cretaceous of Alliford Bay, Q.C.I.

Represented by one specimen about 4·3 cm. wide and 8·5 cm. long. The apex is incomplete, and the leaf was apparently about 12 cm. long in its original condition.

---

[1] Trans. R. Soc. Can., I., iv., 20.

[2] Flora of the Dakota Group, 30.

ZAMITES TENUINERVIS, Fontaine.

Fontaine, Potomac Flora, 171, Pl. LXVII., LXIX., LXXV., LXX., LXXVI., LXXVIII., LXXXIV.

Potomac Formation of Virginia; Trinity Division of Glenrose, Texas; Lower Cretaceous of Alliford Bay, Q.C.I.

Two small fragments which cannot be distinguished from Fontaine's Z. tenuinervis.

NILSONIA POLYMORPHA CRETACEA (Sch.), New Comb.

Schimper, Traité de Paléontologie, I., 489. Atlas, XLV., fig. 6.

Lower Cretaceous of Maud Island, Q.C.I.

The specimen consists of the terminal portion of a pinnate frond apparently of considerable length. Portions of 10 pinnæ are present, some of them perfect. They are alternate, of uniform width, with truncated or rarely acute ends which are turned up so as to give the pinna a falcate form, and they diverge from the rachis at an angle of 70 degrees. The only other Nilsonia recorded from the same horizon in adjacent localities, is N. lata Dn., from Baynes' Sound, Vancouver Island.[1] The difference is such, however, as not to admit of a comparison of the two. N. polymorpha of Schimper is represented by a frond about 25 cm. long and 3·5 cm. wide. The pinnæ in the middle diverge at an angle of 70-75 degrees, and they are distinctly falcately curved with acute ends. As the apex of the frond is approached, the divergence becomes reduced to 70 degrees, the falcate form becomes obscure or is altogether lost, and the acute apex is replaced by a truncated extremity. In these last features we recognize an almost exact duplication of the characters which distinguish the Maud Island specimen, and when we recognize the permissible latitude which is expressed in Schimper's observation that the species is remarkable for its polymorphism, it will appear that our specimen cannot be satisfactorily separated from the type of N. polymorpha. Schimper records that this species is first found in the Rhetic Formation of Europe, and that its greatest development occurred during the period extending from the Rhetic to the Lower Lias. It therefore belongs in Europe, not only to the earlier Mesozoic, but to a transitional age. The occurrence of this plant in the Upper Cretaceous of America has not been recorded heretofore, and it would therefore seem appropriate that the present representative should be designated as N. polymorpha cretacea.

---

[1] Trans. R. Soc. Can., I., iv., 24.

GINKGO PUSILLA, Dn.

(Plate XII. and Plate XIII., fig. 1.)

Dawson, Trans. R. Soc. Can., VI., iv. (1888), 72; XI. (1893), 56 & 73 (foot-note).

Upper Cretaceous of Port McNeil, Vancouver Island, and U.C. of Cumshava Inlet, Q.C.I.

Hitherto this species has been known only through its foliage as described by Sir William Dawson in 1893,[1] but in the material collected at Cumshava Inlet, Queen Charlotte Islands, there was a fragment of a branch which was readily recognized as a Ginkgo. The specimen measured 5·5 cm. long, and it had been compressed into a narrowly elliptical transverse section 2 cm. wide and 3·5 cm. long. No external evidence of bark could be found, but there were indications of more or less extended decay which had resulted in leaving somewhat irregular surface depressions and concavities from which angular fragments had been removed. The section shows a portion of the pith and medullary sheath in a very fair state of preservation. The wood has been subjected to somewhat advanced decay, so that areas show no structure whatever. When the wood structure is preserved, as it is through the greater part of the stem, it is in such condition as to permit a recognition of all the essential details. Growth rings are obvious, but the sharpness of their definition has been obscured by the action of decay which has reduced the thickness of the walls in the summer wood so that the cells cannot be readily differentiated from those of the spring wood. The whole structure is calcified. The following are the structural details observed:

Transverse. (Fig. 11). Growth rings obvious, the spring wood passing gradually into the not strongly defined summer wood; medullary rays very narrow; tracheids in regular radial rows, very uniform, those of the spring wood about 22 × 21 μ the walls 5·3 μ thick.

Radial. (Fig. 12). Medullary rays very low, the cells straight, about 17 μ high, equal to about 5 tracheids; the upper and lower walls thin and not pitted; the terminal walls thin, straight and devoid of pits; the lateral walls with large? pits, one per tracheid. Bordered pits on the radial walls of the tracheids not recognizable.

Tangential. (Fig. 13). Medullary rays 1-3, more rarely 4 cells high, about 8·7 μ broad.

The fact that Ginkgo pusilla is the only species so far reported from this locality, appears to justify reference of our present material to it, and this view seems to gain strength from the observations of Sir William Dawson, who recorded in a footnote to his paper published in 1893,[1] that while the latter was in press, he received a specimen of a flattened, cylindrical stem of about an inch in diameter. He determined the structure to be coniferous, and expressed the opinion that it probably represented the wood of Ginkgo pusilla.

---

[1] Trans. R. Soc. Can., XI., iv., 56.

SEQUOIA LANGSDORFII (Brongn.), Heer.

(Plate XIII., fig. 14, and Plate XIV.)

Dawson, Trans. R. Soc. Can., XI., iv., 56 (1893).

Upper Cretaceous of Nanaimo and Port McNeil, Vancouver; Maud Island; Fort Union Group of Montana and Porcupine Creek, Canada.
Lower Cretaceous of Q.C.I.
Eocene of Alaska; Green River Group of Florissant, Colorado.
Miocene of the John Day Valley, Oregon, and the Mackenzie River.

This species has been known heretofore, only through its foliage and fruit, but in the material from the Queen Charlotte Islands there were two specimens of calcified wood which proved beyond all doubt to be identical with one another and with the genus Sequoia. One represented a small branch devoid of bark. It was 6·5 cm. long and 18 mm. wide in its greatest diameter. It had been flattened somewhat by compression so as to present an elliptical section. The structure proved on the whole, to be in a very excellent state of preservation, although regional areas of more or less extended decay were to be observed. The larger and more important specimen was 12·5 cm. long and compressed into a narrowly elliptical form 7 × 3·7 cm. The remains of barnacles indicated immersion in salt water. There was no external evidence of a cortex, but the end exhibited a somewhat definite indication of what seemed to be separate pith, wood and bark. A complete transverse section served to somewhat modify the opinion formed on the basis of the external features. Decay was found to have been carried so far as to involve the greater portion of the structure. What had been taken for the pith proved to be a region of the wood structure only partially altered by decay. External to this the broad zone supposed to be the wood, was found to be an area of advanced decay which had involved the woody tissue, and nearly obliterated all traces of former structure, so that the resulting modifications from decay and pressure had developed an appearance which, externally, simulated wood with its medullary rays. Externally to this region again, detached areas of wood were found, while externally to all there was a narrower zone of decayed woody tissue so modified as to resemble compressed and modified bark. The details of the microscopic examination are as follows:—

---

[1] Trans. R. Soc. Can., XI., iv., 73.

Transverse. (Fig. 14). Growth rings strongly defined. Tracheids of the spring wood in very regular rows, squarish, about 52 × 52 μ, the walls 14 μ thick, but the secondary layers more or less disintegrated and carbonized. Summer wood about 4-6 tracheids thick, the transition from the spring wood abrupt. Tracheids about 24 μ wide, the walls about 12 μ thick but much altered. Medullary rays prominent, one cell wide. Resin canals generally absent, but sometimes appearing in an imperfectly organized form on the outer face of the summer wood. Special resin cells are not to be distinguished from those in process of disintegration.

Radial. (Fig. 15). Bordered pits on the radial walls of the tracheids in one row, about 28 μ broad, distinctly bordered, the orifice round. Cells of the medullary rays constricted at the ends, about equal to 4? tracheids. The upper and lower walls thin and devoid of pits; the end walls thin, not pitted, straight or curved. The cells about 27 μ high. Pits on the lateral walls not recognizable.

Tangential. (Fig. 16). Medullary rays uniseriate, about 31·5 μ broad.

This species has been found on two former occasions in the Cretaceous of Vancouver Island, and specimens of leafy branches from Port McNeil, described by Sir William Dawson in 1893, are reported by him to be indistinguishable from specimens derived from the Laramie and Middle Tertiary. "It would seem to range from the Upper Cretaceous to the Miocene inclusive." The fact that no other species of Sequoia has been reported from the Cretaceous of the same locality, would seem to justify reference of our present material to it.

Comparison with existing species shows that S. langsdorfii bears a very striking resemblance to S. sempervirens with respect to the structure of the wood. How far this may prove identity it is impossible to say at present, since the wood of S. langsdorfii is deficient in some essential structural features, but it may be noted that the resemblance is most marked with respect to the general structure, the character of the growth rings, and more particularly as established through the medullary rays and the occurrence of imperfectly formed resin passages.

QUERCUS HOLMESII, Lesq.

Lesquereux, Flora of the Dakota Group, 58.
Cretaceous and Tertiary Floras, 38 (1883), Pl. IV., 8.
Dawson, Trans. R. Soc. Can., XI., iv., 59 (1893).

Upper Cretaceous of Port McNeil, Vancouver Island, and Dakota Group of San Juan River, Colorado.

One nearly perfect leaf and several fragments to be referred without doubt, to this species which was reported by Sir William Dawson from the same locality in 1893.

LAUROPHYLLUM INSIGNE, Dn.

Dawson, Trans. R. Soc. Can., XI., iv., 61, Pl. VII., 24 & 25.

Upper Cretaceous of Port McNeil, Vancouver Island.

This species is represented by several fragments of leaves with characteristic venation.

CINNAMOMUM SEZANNENSE, Watlet.

Lesquereux, Flora of the Dakota Group, 107, Pl. XII., 6 & 7.
Dawson, Trans. R. Soc. Can., XI., iv., 64, Pl. XIII., 58.

Cretaceous of Glen Cove and Sea Cliff, Long Island, and Port McNeil, Vancouver Island.

This species is represented in the present collection by one-half a leaf only, but it had been recognized by Sir William Dawson in collections from the same locality in 1893.

PLANTS FROM THE RED DEER RIVER.

In 1889 Mr. Weston, of the Geological Survey, made a collection of plants from the mouth of the Blind Man River, a tributary of the Red Deer River, N.W.T. These plants were supplementary to the collections from the same locality previously reported upon by Sir William Dawson, and published in the Report of the Geological Survey for 1886, and the Transactions of the Royal Society of Canada for 1887. The formation from which these plants were derived, has been assigned to the Laramie. According to a note kindly supplied by Dr. H. M. Ami, of the Geological Survey, the Laramie formation south of the 50th parallel has been divided by Dr. G. M. Dawson into three series, viz.: (1) the Porcupine Hill, (2) the Willow Creek, and (3) the St. Mary River series. In northern Alberta, between 51 deg.

20 m., and 54 deg. 30 m., Mr. Tyrrell has divided the formation into (1) the Edmonton — an estuarine series referable to the Cretaceous — and (2) the Paskapoo — referable to the Eocene Tertiary, a fresh water series of sediments characterized by fresh water mollusca, etc.

The evidence collected by Mr. Tyrrell seems to point to the fact that the Tertiary Epoch was ushered in with the commencement of the Paskapoo series which stands as the representative of the European Eocene. During this time a great thickness of sandstones and shales was laid down without any break or unconformity. This series also is held to include Dr. Dawson's Porcupine Hills and Willow Creek series, together with all but the lowest 700-900 feet of the St. Mary River series. The Paskapoo series embraces the region of the Red Deer and Blind Man Rivers. "The bed consists of more or less hard, light grey or yellowish, brownish weathering sandstone, usually thick bedded, but often showing false bedding; also of light bluish-grey and olive sandy shales, often interstratified with bands of hard, lamellar, ferruginous sandstone, and sometimes with bands of concretionary blue limestone. The whole series as shown by its invertebrate fauna, is of fresh water origin."[1] The plants derived from the explorations of 1885-86 were determined by Sir William Dawson and published without illustrations. Combining the earlier list as given by Tyrrell,[2] with the later list published in the following year by Sir William Dawson,[3] and omitting duplications, the recognized species were as follows: —

Onoclea sensibilis, Newby.
Sequoia langsdorfii (Brgt.), Heer.
    " nordenskioldii, Heer.
    " couttsiæ, Heer.
Podocarpites tyrrellii, Dn.
Taxodium occidentale, Newby.
Platanus nobilis, Newby.
Corylus macquarrii (Forbes), Heer.
Quercus sp.
Populus acerifolia, Newby.
    " artica, Heer.
    " richardsoni, Heer.
    " genetrix, Newby.
    " nervosa (?), Newby.
Salix laramiana, Dn.
Ficus sp.
Carya antiquorum, Newby.
Nelumbium saskatchuense, Dn.
Trapa borealis, Heer.
Viburnum saskatchuense, Dn.
    " asperum, Newby.
Catalpa crassifolia, Newby.
Sapindus sp.

---

[1] Rept. Geol. Surv. Can., N. Ser., II. (1886), 135 E.

[2] *Ibid*, 136 E.

[3] Trans. R. Soc. Can., V. (1887), iv., 35.

In addition to the above, Dr. H. M. Ami informs me that there are also specimens of Juglans sp. and Abietites tyrrellii, Dn., in the collections of the Geological Survey, so that the entire list of plants from these earlier explorations, embraces 25 species. The collection by Mr. Weston in 1889, now under consideration, embraces 29 species, and the former lists are therefore extended by 24, and possibly by 26 additional species. The entire collection is as follows: —

SPHENOPTERIS GUYOTTII, Lesq.

Lesquereux, Cretaceous and Tertiary Floras, VIII., 137, Pl. XXI., 1-7.

Tertiary of the Green River Group, Florissant, Colorado; and Paskapoo Series of Red Deer River, Canada.

The original description of this plant was given by Lesquereux in his Cretaceous and Tertiary Flora, as based upon specimens from Florissant, Colorado. The present determination is based upon one small fragment of a pinna, and is by no means satisfactory, though the venation and the form of the ultimate segments seem to point to the correctness of its reference to S. guyottii.

SPHENOPTERIS BLOMSTRANDI, Heer.

Heer, The Miocene Flora of Greenland (1874), 18, Pl. I., 3-5.
The Miocene Flora and Fauna of Spitzbergen (1870), 31.

Eocene (Paskapoo Series) of Red Deer River, Canada.

This species appears to be represented in the Paskapoo Series by several fragments of fronds. As determined by both venation and form of the pinnules, they are apparently inseparable from the type as figured by Heer in his Miocene Flora of Greenland and Spitzbergen.

LASTREA FISCHERI, Heer.

Newberry, Later Extinct Floras, XXXV., 10, Pl. XLVIII., 6.

Miocene of the John Day Valley, Oregon; Eocene of the Red Deer River, Canada.

One specimen showing three fragments of as many pinnæ. The form, size and other features of the pinnules correspond exactly with the diagnosis for L. fischeri, but in the latter there are about ten nerves on each side of the midrib, while in our specimen the nerves never exceed seven pairs, and there are frequently not more than four. It is therefore provisionally referred to L. fischeri.

EQUISETUM ARCTICUM, Heer.

Heer, Miocene Flora and Fauna of Spitzbergen, 1870, 31, Pl. I., 1-15; II., 2 & 3*b*.
Dawson, Trans. R. Soc. Can., IV. (1886), iv., 22, Pl. I., 2.

Miocene of Spitzbergen; Eocene of Red Deer River, Canada.

The original description of this species appears in Heer's Miocene Flora of Spitzbergen, where also several excellent figures of the plant are given, showing the stem in longitudinal and transverse aspects, together with numerous tubers. The plants are shown to closely resemble the existing species of E. limosum, and they are found in great abundance at King's Bay.

In the material from Red Deer River, there are no complete stems. These structures are represented only in end view, and show nodal sections from which roots and tubers radiate. The tubers, when perfect, are upwards of 7 mm. wide and 2 cm. long. They are borne upon short stalks and are somewhat broadly club-shaped, with an abrupt or almost truncate termination. The surface is strongly rugose. The very close resemblance which these specimens bear to E. arcticum, leaves no room for doubt that they may be referred to that species. Lesquereux describes an Equisetum from the Tertiary of Green River Station, Wyoming, under the name of E. wyomingense which it is very difficult to separate from E. arcticum, the only real difference appearing in the length of the internodes.

Sir William Dawson observed two species of Equisetum in the Upper Laramie of Porcupine Creek and of Great Valley[1] in lat. 49, long. 105. The specimen from Porcupine Creek is neither figured nor described, but it is spoken of as having a diameter of one quarter of an inch, and its close resemblance to E. arcticum of Heer, and to E. wyomingense of Lesquereux is noted, but identity could not be established. The specimen from Great Valley is not described, but it is figured. The figure shows a short fragment of stem with tubers. The plant was described in the Report on the 49th Parallel under the name of Physagenia parlatorii, and the opinion is expressed that all specimens passing under that name, and abundant in Canada and the United States, represent species of Equisetum. In the present instance, it seems highly probable that all of these species as figured, may be referred to E. arcticum, though the identity is not clearly established by the figures and descriptions so far published.

---

[1] Trans. R. Soc. Can., IV. (1886), iv., 22.

SEQUOIA COUTTSIÆ, Heer.

Heer, Flora of Northern Greenland (1869), 464, Pl. XLI., 1-9; XLII., 1; XLVIII.
Knowlton, Fossil Flora of the Yellowstone National Park, XXXII., 681.
Dawson, Trans. R. Soc. Can., V. (1887), iv., 35.
Rept. Geol. Surv. Can., N. Ser., II. (1886), 135 E.

Eocene of the Red Deer River, Canada; Laramie of the Yellowstone National Park; Lower Miocene of Greenland; Cretaceous of Staten Island.

Numerous fragments of leafy branches together with one specimen showing two cones, apparently young. This species was found in the former collections recorded by Sir William Dawson from the same locality.

SEQUOIA NORDENSKIOLDII, Heer.

Heer, Miocene Fauna and Flora of Spitzbergen (1870), 36, Pl. II, 13*b*.
Newberry, Later Extinct Floras of N. America, XXXV., 20, Pl. XXVI., 4.
Dawson, Trans. R. Soc. Can., IV. (1886), iv., 22.

Miocene of John Day Valley, Oregon; Mackenzie River.
Upper Laramie (Eocene) of Porcupine Creek, Great Valley and Red Deer River, Canada.

In the original description of this well known species from Cape Staratschin, Spitzbergen, Heer lays stress upon the decurrent character of the leaves. In the present material from the Red Deer River, which consists of three specimens of short, leafy branches, there is an exact agreement with the diagnosis, except that the leaves are here spreading, while in the type they are more or less conspicuously appressed to the branch. Newberry, on the other hand, in describing specimens from the Laramie of the Yellowstone River in Montana, figures several branches in which the leaves are spreading exactly as in the specimens from the Red Deer River.

TAXODIUM DISTICHUM MIOCENUM, Heer.

Heer, Flora Foss. Sachalinensis, 22, Pl. I., 9.
Flora of Northern Greenland (1869), 463, Pl. XLIII., 4, 5.
Miocene Flora of Spitzbergen (1870), 32, Pl. II. & III.
Dawson, Trans. R. Soc. Can., VIII., iv., 79; I. (1882), iv., 33 & 34.
Newberry, Later Extinct Floras of the U.S., XXXV., 22, Pl. XLVII., 6; L. 3; LII., 2, 3, 4; LV., 5.

Miocene of Greenland; Birch Bay, Washington and John Day Valley, Oregon. Fort Union Group of Montana. Eocene of Elko Station, Nevada and Red Deer River, Canada. Miocene of the Similkameen Valley, British Columbia, and Mackenzie River.

This widely spread and familiar species appears in the Paskapoo series of the Red Deer River in the form of several fragments of leafy branches, but without fruit. They show the characteristic features of the species.

GLYPTOSTROBUS EUROPÆUS (Brongt.), Heer.

Dawson, Trans. R. Soc. Can., VIII., iv., 791 (1882), iv., 34.
Newberry, Later Extinct Floras of the U.S., XXXV., 24, Pl. XXVI., 6 & 8a; LV., 3, 4.
Lesquereux, Tertiary Floras, VII., 74, Pl. VII., 1, 2.
Cretaceous and Tertiary Floras, VIII., 222, Pl. XLVI., 1.

Eocene of the Paskapoo Series, Red Deer River, Canada.
Miocene of Stump Lake and the Similkameen Valley, B.C.
Miocene of the Bad Lands and the Yellowstone Valley.
Fort Union Group of Dakota and Birch Bay, Washington.
Green River Group of Florissant, Colorado.

In the Paskapoo series, Glyptostrobus europæus is represented by one small, leafy stem only. In the Flora of the Similkameen Valley, Sir William Dawson figured a small specimen of Glyptostrobus which he hesitated to identify, although admitting its close resemblance to G. europæus from the Miocene of Europe. It would seem to me that there is no real ground for hesitation in admitting the identity of this species.

TYPHA, sp.

Eocene of the Paskapoo Series, Red Deer River, N.W.T.

Leaf narrowly lanceolate, apex acute (?), margin entire. Veins numerous, about 36 to the cm., unequal, and not equidistant; transverse veinlets none.

The specimen upon which the above diagnosis is founded is about 11·5 cm. long and 17 mm. broad at the lower end where it has been broken off. It evidently represents the upper portion of a narrowly lanceolate leaf, but the termination cannot be properly determined although the natural continuation of the side lines would seem to indicate an acute apex. There are also two smaller fragments of the same type of leaf showing the same characters.

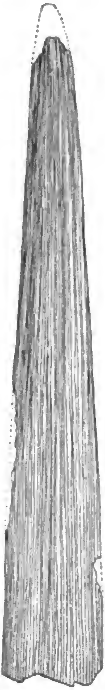


FIG. 3.—TYPHA LEAF.

The form and general character of this fossil at once suggest its relation to Iris, Phragmites or Typha. A critical inspection, however, at once shows that the complete absence of distinct nerves must serve to exclude it from both Iris and Phragmites, and it must therefore be excluded from all connection with P. alaskana of Heer, as figured and described by both Lesquereux[1] and Knowlton, but to which its general form would seem to make it allied.

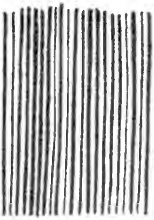


FIG. 4.—TYPHA VENATION. x 5.

A critical examination of two species of typha has served to bring out the possible connection of this fossil with that genus. In T. latifolia, a leaf having the same width as the fossil showed a complete absence of nerves, but the presence of numerous unequal, and unequally distant veins to the number of about 83 per cm. These veins are not connected by transverse veinlets as in Iris, and as called for in most of the descriptions of Phragmites. The absence of nerves, however, is not a constant character, since in larger leaves these structures appear chiefly toward the base where they are also obsolete to some extent, and their distribution within the width of the blade is by no means uniform. The veins of T. latifolia appear to be about twice as numerous as in the fossil, but this would seem to be of the nature of a specific variation, since in T. angustifolia they are only 48 per cm. In all cases the veins are distinguished by their unequal size and variable distance as in the fossil.

Lesquereux has described a species of Typha from the Green River Group of Florissant, Colorado,[2] but both description and figures seem to be wholly inapplicable to the genus as far as it is represented by existing forms. In T. latifolia and T. angustifolia, both of which he refers to for general comparison, the veins are either all alike, though variable in size and proximity, or there are more or less prominent nerves about 1 mm. distant, with about 7 intermediate veins which are alternately larger and smaller. In no case do herbarium specimens exhibit transverse veinlets, and certainly nothing of the sort could become conspicuous in the impression of a fossil leaf of this genus. It is therefore evident that the statement that the leaves are " marked lengthwise by parallel nerves (14) crossed at right angles by transverse thin lines; intermedial veinlets numerous (10 — 13," cannot apply to Typha. The "transverse thin lines" here referred to as connecting the nerves and crossing the 10 — 13 "intermedial veinlets" cannot be interpreted as ordinary cell walls, but they must obviously be regarded as cellular partitions, the spaces between which are air chambers; the entire structure is therefore of that type which is not uncommon in aquatics, and in the broad sheathing petioles of Sagittaria, the characteristics of Typha latissima are very nearly represented.

---

[1] Tertiary Flora, VII., 90.

[2] Cret. & Tert. Floras, VIII., 141, Pl. XXIII., 4. 4*a*.

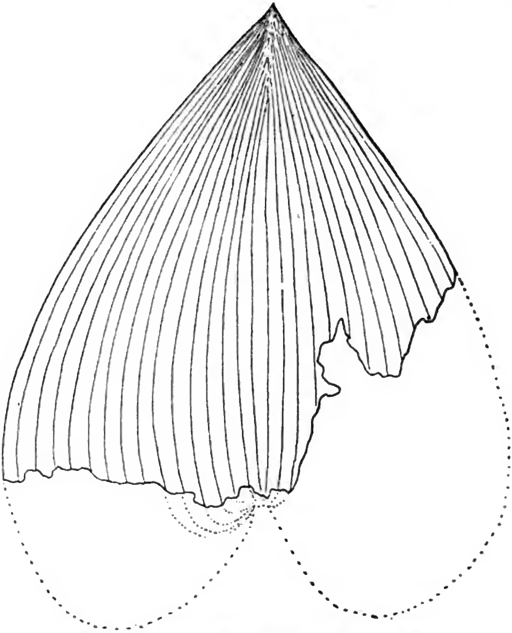


FIG. 5.—MAJANTHEMOPHYLLUM GRANDIFOLIUM.

MAJANTHEMOPHYLLUM GRANDIFOLIUM, n.sp.

Eocene of the Red Deer River, N.W.T.

Leaf broadly ovate, about 9·5 cm. wide, and 11·2 cm. long from the base of the sinus to the apex; apex acute; margin entire; obscurely three nerved, the veins about 2 — 3 mm. distant, the chiefly obscure cross veins either wholly transverse or diagonal.

This diagnosis is based upon one fairly well preserved specimen of which the basal lobes are wanting, and upon three other less complete fragments which show a much less perfect state of preservation, inasmuch as they show no veins, or at the best exhibit them but obscurely. That this leaf is that of an endogen admits of no doubt, and a comparison with the leaves of existing species soon served to establish a general resemblance to those of Maianthemum bifolium dilatatum. The leaves of this species vary somewhat widely as to their form and the development of the basal sinus, but the following may be taken to represent the essential characteristics so far as they could be obtained from a number of herbarium specimens.

Leaf broadly ovate, about 7 cm. broad, and upwards of 10 cm. long from the base of the sinus to the apex. Sinus broad and shallow or upwards of 3 cm. deep. Margin entire; the apex acuminate or abruptly acute. Nerves about 11, somewhat prominent toward the base, but becoming obscure and finally obsolete toward the apex; the interval variable, but at the point of curvature toward the apex, about 5 mm. distant; the veins about 1 mm. distant.

From the above descriptions, it would seem that our fossil has its nearest representative among living plants in Maianthemum bifolium, and it should therefore be referred to the genus Majanthemophyllum of Weber. The very large size of the leaf suggests the propriety of grandifolium for the specific name. Of Tertiary representatives of this genus, Schimper enumerates four species as common in Europe,[1] and Hollick has described one [2]— M. pusillum — from the Cretaceous of Staten Island. As given by Schimper, and as defined by the figure of M. pusillum given by Hollick, there seems to be no essential point of agreement with the Red Deer River material, which represents a different specific type and requires to be separately designated.

CLINTONIA OBLONGIFOLIA, n. sp.

Eocene of the Paskapoo Series, Red Deer River, N.W.T.

Leaf lanceolate oblong, about 3.5 cm. wide and 9 cm. long. Apex acute ?; margin entire; the base tapering into a margined petiole; midrib not apparent; veins fine, obscure, distant about 1 mm.; nerves obscure.

---

[1] Paléontologie Végétale, II., 440; III., 582.

[2] Trans. N.Y. Acad. Sc., XII., 36 (1892).

The apex of the specimen has been truncated to a width of about 7 mm., but a continuation of the side lines makes it probable that the termination was acute. The base is rounded, but the folding in of the sides at the position of the midrib, indicates the existence of a tapering base which probably extended into a short and margined petiole which may also have been sheathing. The nerves are very obscure and observable at one point only, thus making it doubtful if they were prominent in the original plant. The veins are fine and numerous though obscure. They are uniformly distant 1 mm., and they are connected by transverse veinlets at intervals which could not be determined with accuracy. The undoubtedly endogenous character of this specimen has led to a comparison with the genus Clintonia which it closely resembles. A diagnosis of a leaf taken from C. borealis, gives the following results:—

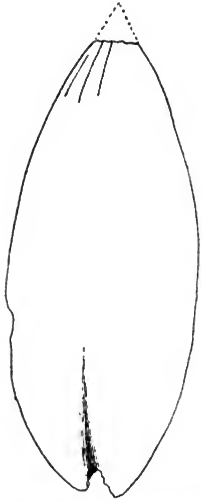


FIG. 6.—CLINTONIA OBLONGIFOLIA.

Leaves very variable, elliptical oblong to narrowly oblong; midrib obscure; veins numerous, not prominent, distant 1 mm., and connected by transverse veins which are somewhat conspicuous, rarely oblique, and distant about 2 — 3 mm.

From this it appears that there is a very close resemblance between the fossil and the leaves of existing Clintonias, a resemblance so close not only with respect to general features, but with respect also, to details, that I do not hesitate to assign the fossil to the genus under the name of C. oblongifolia.

POPULUS UNGERI, Lesq.

Lesquereux, Tertiary Flora, VII., 175, Pl. XXIV., 5.

Denver Group, Golden, Colorado.
Eocene of the Red Deer River (Paskapoo Series), N.W.T.

One nearly perfect specimen evidently identical with Populus ungeri of Lesquereux, originally described by him from the Denver Group of Golden, Colorado.

POPULUS OBTRITA, Dn.

Dawson, Trans. R. Soc. Can., VIII., iv., 82 (1890).

Lower Miocene of the Similkameen Valley, B.C.
Eocene of the Red Deer River (Paskapoo Series), N.W.T.

The original description of this species was based upon material from the Lower Miocene of the Similkameen Valley, B.C., and the diagnosis is supplemented by a figure of a very complete specimen. The peculiarities of the species are to be found in the broadly ovate, or almost reniform shape of the leaf, its dentate margin and especially the venation which embraces two strongly defined veins curving strongly upward from the summit of the petiole, thus giving rise to one strong lateral in each case.

The material from the Red Deer River embraces several specimens, three of which are very perfect and admit of determination beyond all doubt.

POPULUS DAPHNOGENOIDES, Ward.

Ward, Bull. U.S. Geol. Surv., No. 37, p. 20.
Dawson, Trans. R. Soc. Can., VIII., iv., 83 (1890).

Fort Union Group of Seven Mile Creek, Montana.
Lower Miocene of the Similkameen Valley, B.C.
Eocene of the Red Deer River (Paskapoo Series), N.W.T .

Represented by one small specimen, evidently a young leaf not more than 2·5 cm. broad, from which the upper third has been removed. The base, margin and venation, so far as they appear, are quite perfect and characteristic, and they seem to leave no doubt as to the identity of the species.

This species was originally obtained from the Fort Union Group at Seven Mile Creek, Montana, and described by Ward. More recently it has been found in the Miocene of the Similkameen Valley as described by Sir William Dawson.

POPULUS RICHARDSONII, Heer.

Heer, Fossil Flora of Northern Greenland, 468, Pl. XLIV., 7, 8, 9; LV., 3*b*.
Miocene Flora of Northern Canada, 13 (1880), Pl. I., 2*d*. 3.
Lesquereux, Tertiary Flora, VII., 177, Pl. XXII.
Cretaceous and Tertiary Flora, VIII., 159, 224, 260.

Green River Group, Colorado and Elko Station, Nevada.
Miocene of the Bad Lands, Dakota; Chignik Bay, Alaska; Northern Greenland and the Mackenzie River.
Eocene of the Red Deer River (Paskapoo Series), N.W.T.

This very familiar and widely distributed specimen of poplar appears in the Eocene from the Red Deer River, and in the material now in hand it is seen in the form of one incomplete leaf 5·5 cm. wide and 4·5 cm. long. It shows the cordate base, characteristic venation and dentate margin, though the latter is largely obliterated.

QUERCUS ELLISIANA, Lesq.

Lesquereux, Tertiary Flora, VII. (1878), 156, Pl. XX., 4-8.

Laramie Group, Bozeman, Montana.
Eocene of Red Deer River, N.W.T.

A fragment of a leaf devoid of base and apex, but the general contour, venation and margin, appear to make reference to Quercus ellisiana correct.

CORYLUS AMERICANA, FOSSILIS, Newb.

Newberry, Later Extinct Floras, XXXV., 60, Pl. XXIX., 8-10.

Fort Union Group of Seven Mile Creek, Montana, and Fort Union, Dakota.
Laramie of Porcupine Creek, Canada.
Eocene of Red Deer River, N.W.T.

This species is recorded by Newberry from the Fort Union Group of Dakota and Montana. It also appears in the Upper Laramie of Porcupine Creek, Canada, and is again found in the Eocene of the Paskapoo series at Red Deer River, which locality is represented by a single fragment of a leaf distinguished by the general form and characteristic venation.

CORYLUS MACQUARRII, Forbes.

Heer, Flora Fossilis Arctica (1880), 14, Pl. I., 1 & 2*b*.
Flora of Northern Greenland (1889), 469, Pl. XLIV., 11*a*; XLV., 6*b*.
Miocene Flora and Fauna of Spitzbergen (1870), 56, Pl. XI., 10-13; XIII., 35*b*.
Lesquereux, Cretaceous and Tertiary Floras, VIII., 223, Pl. XLIX., 4.
" Tertiary Floras, VII., 144, Pl. XVIII., 9-11.
Newberry, Later Extinct Floras, XXXV., 61, Pl. XXXII., 5; XLVIII, 4.
Knowlton, Flora of the Yellowstone Nat. Park, XXXII., 699, Pl. LXXXVI., 3.
Forbes, Quart. Jn'l Geol. Soc., VII. (1851), 103, Pl. IV., 3.

Eocene of Alaska, the Mackenzie River and Red Deer River, N.W.T.
Fort Union Group, Montana and Porcupine Creek, B.C.
Laramie Group of Wyoming.
Miocene of the Yellowstone Park, Northern Greenland and Spitzbergen.

This species originally described by Forbes as Alnites, but transferred to Corylus by Heer, is represented in the material from the Red Deer River by two leaves, one of which is 7·5 × 11·5 cm. and shows the characteristic base, venation and to a large extent, also the margin. The other fragment of about half the size of the first, has had a large portion of its margin removed. Otherwise it answers to the characters of the species.

In his Flora of Spitzbergen, Heer describes many fragments of leaves which he refers to this species, but the fragmentary nature of the material leaves an element of doubt as to the identification. From the same locality — Cape Staratschin — he also describes several fruit-like bodies considered as possibly the fruit of this species. In his Miocene Flora of Northern Canada, Heer also records and figures the same species, the fragments of leaves shown, exhibiting in their well preserved venation, characteristic features.

Lesquereux has recorded the occurrence of this species in the Tertiary of the Washiki Group at Carbon Station, Wyoming. He further draws attention to the fact that at that time no specimens had been seen from the Upper Miocene of the Green River and the Parks, and that such material as has been obtained from the Lower Lignitic, represents indistinct and scarcely determinable specimens. In his Cretaceous and Tertiary Floras, however, he records its occurrence in the Miocene of the Bad Lands, and gives an excellent figure of a nearly complete leaf. The best diagnosis of this abundant and widespread species, as illustrated by a very characteristic and nearly complete specimen, and that which is chiefly relied upon in the present determination, is given by Newberry in the Later Extinct Floras of North America, where material from the Fort Union Group is described.

ALNITES GRANDIFOLIA, Newb.

Newberry, Later Extinct Floras, XXXV., 67, Pl. IV., 2.

Dakota Group of Nebraska; Paskapoo Group (Eocene) of Red Deer River, Canada.

Represented by three fragments of leaves which collectively show the base, margin and venation. The species was originally described by Newberry who figures it in his Later Extinct Floras as derived from the Cretaceous of Smoky Hill, Kansas.

CARYA ANTIQUORUM, Newb.

Newberry, Later Extinct Floras of N.A., XXXV., 35, Pl. XXXI., 1-4.
Lesquereux, Tertiary Floras, VII., 289, Pl. LVII., LVIII.
Cretaceous and Tertiary Floras, VIII., 236.

Fort Union Group of the Yellowstone Valley, Montana.
Denver Group of Carbon and Evanston, Wyoming; Cross Lake, Louisiana.
Upper Laramie of Porcupine Creek, Rocky Mountain House and the Paskapoo Series of the Red Deer River, N.W.T.

The material from the Red Deer River embraces several specimens of this species representing venation, margin and apex. The original description of this species occurs in Newberry's Notes on the Later Extinct Floras of North America, and is reported in full, together with excellent figures, in his more voluminous treatment of the same subject in the publications of the U. S. Geological Survey.

JUGLANS LECONTEANA, Lesq.

Lesquereux, Tertiary Flora, VII., 285, Pl. LIV., 10-13.

Denver Group of Evanston, Wyoming.
Laramie of Marshall, Colorado.
Eocene of Cherry Creek, Oregon, and Red Deer River, N.W.T.

Two partial fragments of leaves which show the characteristic venation of this species.

JUGLANS OCCIDENTALIS, Newb.

Newberry, Later Extinct Floras of N.A., XXXV., 34, Pl. LXVI., LXV.

Eocene of the Green River, Wyoming, and Red Deer River, N.W.T.

This species was originally described by Newberry from the Tertiary of the Green River Group of Wyoming, and as at present known, is of very restricted distribution. It nevertheless reappears in the Paskapoo series of Canada, as represented by a fragment of a leaf embracing the apex. The material is so small and imperfectly preserved that identification is somewhat doubtful, but it seems to be as above indicated.

JUGLANS LAURIFOLIA, Kn.

Knowlton, Fossil Flora of the Yellowstone National Park, XXXII., 688, Pl. LXXXIII., 2 & 3.

Tertiary of Yanceys and Chaos Mountain, Yellowstone National Park.
Eocene of Red Deer River, N.W.T.

This species was first described by Knowlton from the Laramie of the Yellowstone Park, and it now reappears in the Paskapoo of the Red Deer River in the form of a single, imperfect leaf, but the characters are such as to make identification reasonably complete.

JUGLANS ACUMINATA, A. Braun.

Heer, Arctic Flora, 1869, 483, Pl. LVI., 5, 6.

Eocene of Port Graham, Alaska, and Red Deer River, N.W.T.
Lower Miocene of N. Greenland.

The material from the Red Deer River is represented by one nearly complete leaf which agrees with the descriptions and figures of Juglans acuminata, as given by Heer, based upon specimens from the Lower Miocene of Northern Greenland at Copenhagen.

Viburnum ovatum, n. sp.

Eocene of the Red Deer River, N.W.T.

This species is represented by one small leaf, 3·5 × 6 cm., with about one-third wanting, but the remainder shows the margin, venation and apex, though the base is wholly wanting. The fragmentary nature of the material makes the foundation of a new species unsatisfactory, and the name V. ovatum is therefore given provisionally.

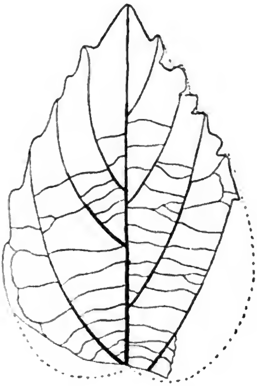


Fig. 7.—Viburnum ovatum.

Leaves small with a well defined ovate form; apex acute; margin rather coarsely dentate towards the apex, the teeth rounded.

Cornus rhamnifolia, O. Web.

Lesquereux, Tertiary Floras, VII., 244, Pl. XLII., 6.

Laramie Group of Montana.
Montana Formation, Wyoming.
Paskapoo Series (Eocene) of the Red Deer River, N.W.T.

Represented by three well preserved and nearly complete specimens of leaves which present the characteristic features as defined by Lesquereux, and as figured by him in the Tertiary Flora.

CERCIS PARVIFOLIA, Lesq.

Lesquereux, Cretaceous and Tertiary Floras, VIII. (1883), 201, Pl. XXXI., 5-7.

Green River Group of Florissant, Colorado.
Paskapoo Series (Eocene) of Red Deer River, N.W.T.

The original of this species was described by Lesquereux from the Green River Group at Florissant, Colorado. It is distinguished by its small size, and it now reappears in the Paskapoo series of the Red Deer River. The material shows a leaf from which the apex has been removed, but otherwise perfect. In addition it shows one-half of a fruit-like body resembling a cherry stone, and strongly suggestive of the fruit of Tilia or Celtis.

PHYLLITES CARNEOSUS, Newb.

Newberry, Later Extinct Floras, XXXV., 134, Pl. XLI., 1, 2.

Fort Union Group, Dakota.
Paskapoo Series (Eocene) of the Red Deer River, N.W.T.

This problematical genus is represented in the material from the Red Deer River by two leaves which conform to the descriptions and figures derived by Hayden from the Fort Union Group of Dakota.

DUBIOUS SPECIES.

In the material from the Red Deer River there were several fragments of a foliaceous fossil, none of which show a normal outline, or even a portion of a normal margin. The three most perfect specimens measure respectively 4·5 × 8·5 cm. ; 3·7 × 6·5 cm. and 2·2 × 9·5 cm. The surface shows a uniform structure entirely devoid

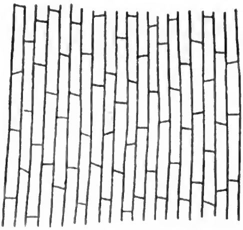


FIG. 8.—VENATION OF A DOUBTFUL SPECIES. x 6.

of nerves, but marked by fine veins at regular intervals and about 30 to the cm., or 22 per cm., the latter probably being the normal number. At intervals of about 1·5 mm. cross veins or bars connect the former either transversely or diagonally. In detail, the appearance of the structure is like that which characterizes the various descriptions and figures of Phragmites between the nerves. The apparently great breadth of the organ represented, the complete absence of nerves and also the absence of secondary veinlets traversed at right angles by the cross bars, serve to exclude it completely from both Phragmites and Typha as usually described in palæobotanical works, and by the same characters the fossils are excluded from relationship with Phragmites and Typha as expressed in the structure of existing representatives of those genera.

Among recognized fossil plants, there is great difficulty in establishing identity, but Fontaine figures a somewhat similar fragment from the Mesozoic of Virginia. This specimen shows about 20 veins to the cm. The description reads as follows: —

> "Stem finely striate; punctures, or bars, between all the striæ. The transverse bars, under a good glass, are much like dots, and do not always connect the longitudinal lines."

This diagnosis applies to Calamites punctatus, Emmons, which Fontaine identifies with and transfers to Sphenozamites rogersianus, and the close similarity of the present material, suggests possible identity.

An analysis of the preceding table by localities, shows that of a total of 58 stations for the plants of the Paskapoo series as previously determined, 34·48 per cent are Miocene, 60·34 per cent are Eocene and only 5·17 per cent are Cretaceous. Out of the 28 species included in the list from the Red Deer River, 24 have been definitely recognized and associated with particular formations. Employing this as a basis, the percentage distribution of the Red Deer River plants would be, Miocene 12·5 per cent, Eocene 83·33 per cent, and Cretaceous 4·16 per cent. Yet again, of the Eocene plants, 10 per cent also extend into the Cretaceous, while 45 per cent extend into the Miocene, thus leaving 55 per cent which may be regarded as purely Eocene, while 10 per cent are common to both Cretaceous and Miocene. Of the purely Cretaceous type, so far as its previous record is concerned, is Alnites grandifolia which Newberry observed in the Dakota Group, where at least two other species have been recognized, while Alnites insignis also occurs in the Upper Cretaceous at Nanaimo. The genus Alnus as known on this continent is altogether Tertiary, ranging from the Eocene to Pleistocene, and the same is true of its occurrence in Europe, from which it would appear that the genus Alnites is to be regarded as a Tertiary and not as a Cretaceous type. Sequoia couttsiæ is a species of wide range, extending from Cretaceous to Miocene, and the same is largely true of Cornus rhamnifolia, so that both are to be viewed as essentially Tertiary types. Viburnum ovatum which appears to be a new species, belongs to a genus which is found in both the Cretaceous and Tertiary of North America, but by far the larger number of species are of Tertiary age, while in Europe, it does not appear before the Eocene where it has few representatives, but in the Miocene it is augmented by a large number of species. Clintonia oblongfolia has not been recognized on this continent heretofore, and in Europe also, it has no representative. It therefore affords no special evidence as to the age of the Paskapoo series. Maianthemum is represented in the Cretaceous of North America by Majanthemophyllum pusillum from Staten Island. In Europe it does not appear before the Miocene where it is represented by four species, but it is most abundant in the later part of this age.

So far then as these comparisons afford evidence, the flora of the Paskapoo series abundantly confirms the conclusion of Mr. Tyrrell that this formation is of Eocene age.

TERTIARY OF THE HORSEFLY RIVER, B.C.

One small collection was marked "Horsefly River, B.C., G. M. Dawson, 1894." It embraced only eleven species, but in 1901, Mr. Thomas Drummond brought to me a small specimen of fossil wood from the Miocene Mines at that locality, and it has been added to the collection. The species recognized are as follows: —

GLYPTOSTROBUS EUROPÆUS, Heer.

Represented by small fragments of leafy branches only.

TAXODIUM DISTICHUM, MIOCENUM, Heer.

Represented by several characteristic, leaf-bearing branches.

SEQUOIA LANGSDORFII (Brongn.), Heer.

Represented by one fairly well preserved cone and by several leafy branches.

PSEUDOTSUGA MIOCENA, n. sp.

(Plate XV. and XVI.)

The specimen representing this species is a small fragment of a stem secured by Senator R. H. Campbell, of Cariboo, B.C., and forwarded through Mr. Thomas Drummond in 1901. It was obtained from Cariboo Mine, on the Horsefly River, at a depth of 400 — 500 feet, where there is reported to be a large amount of material oftentimes representing tree trunks between two and three feet in diameter. Much of the material is carbonized. The deposit in which it occurs is described as a white quartz gravel resting upon a stratified and indurated clay.

The specimen placed in my hands was only a few centimeters in length. A small portion was carbonized and had the aspect of cortical structure, but under the microscope it shows no details whatever. The principal portion of the specimen had the appearance of a decorticated fragment of a branch, which it eventually proved to be. The details of its examination are as follows:—

Transverse. (Fig. 17.) Growth rings prominent; the spring wood passing gradually into the summer wood. Resin canals rather abundant and scattering, the details of structure not recognizable.

Radial. (Fig. 18.) Tracheids highly altered by decay and maceration; spiral structure of the wall conspicuous but due to extreme development of the striation through maceration, the normal spirals of secondary growth not recognizable; bordered pits nearly obliterated, in one row. Details of structure in the medullary rays are nearly obliterated; pits on the lateral walls about 4 per tracheid, bordered?

Tangential. (Figs. 19 and 20.) The structure shows extreme alteration through decay. The medullary rays of the uniseriate type have round or oval cells about 24·5 μ broad; those of the fusiform type have thick-walled cells and in their general structure are comparable with those of Tsuga, Picea and Pseudotsuga.

There can be no doubt that this specimen represents the wood of Pseudotsuga, and it thus acquires additional interest because it is the first instance of which I am aware, of the occurrence of this genus in the Miocene, or of even later formations, though it is a matter of some surprise that it has not long since appeared in the great abundance of material collected from the Tertiary deposits of the western portion of this continent, where it is now so conspicuous an element of the forests.

PINUS TRUNCULUS, Dn.

awson, Trans. R. Soc. Can. (1890), VIII., iv., 78.

This species was first described by Sir William Dawson on the basis of a single leaf from the Lower Miocene of the Similkameen Valley at Stump Lake, B.C., and it now reappears in the Miocene of the Horsefly River.

CASTANEA CASTANÆFOLIA (Ung.), Kn.

Lesquereux, Cretaceous and Tertiary Floras, VIII. (1883), 246, Pl. LII., 1, 3-7.
Heer, Phil. Trans., CLXIX., 470, Pl. LV., 1-3; XLVI., 8 (1889).

The specimens from the Horsefly River represent fragments of leaves only, but they are to be identified without doubt, with Castanea castanæfolia.

ALNITES CURTA, Dn.

Dawson, Trans. R. Soc. Can. (1890), VIII., iv., 86.

Originally described by Sir William Dawson from the Lower Miocene of the Similkameen River, on the basis of leaf and fruit. It appears in the Miocene of the Horsefly as leaves only.

BETULA STEVENSONI, Lesq.

Lesquereux, Tertiary Flora (1878), VII., 139, Pl. XVIII.

As described by Lesquereux, this species is already known in the Laramie of Wyoming. In the Miocene of the Horsefly, it appears in the form of imperfectly preserved leaves of varying sizes, but with characteristic venation and margins.

PLANERA LONGIFOLIA, Lesq.

Lesquereux, Tertiary Flora, VII., 189, Pl. XXVII., 4-6.
Cretaceous and Tertiary Floras (1883), VIII., 161, Pl. XXIX., 1-3.

This species occurs in the Green River Group of Wyoming, and now reappears in the Miocene of the Horsefly as fragments of leaves, often in a very imperfect state of preservation.

ARALIA NOTATA, Lesq.

Lesquereux, Tertiary Flora (1878), VII., 237, Pl. XXXIX., 2-4.

Several fragments of leaves with characteristic venation.

ACER DUBIUM, n. sp.

One specimen showing the wing of a fruit but no seed vessel. This was correctly referred to the genus Acer by Sir William Dawson, but as the material is altogether insufficient for accurate diagnosis, it is provisionally assigned to A. dubium.

NELUMBIUM PYGMÆUM, Dn.

Dawson, Trans. R. Soc. Can. (1890), VIII., iv., 87.

Two imperfectly preserved leaves only. The only other locality for this species is on Mill Creek, Similkameen River, and therefore Lower Miocene.

		CRETACEOUS	LARAMIE AND EOCENE.							MIOCENE			
	Horsefly River, B.C.	Upper Cretaceous of Nanaimo, B.C.	Laramie of B.C. and Wyoming	Yellowstone National Park	Denver Group of Colorado	Fort Union Group, Montana	Green River Group, Colorado and Wyoming	Eocene of Alaska and Oregon	Red Deer River	L. Miocene (oligocene) Canada, Similkamen Val.	Miocene of Oregon, B.C., California & Mackenzie River	Miocene of Northern Greenland	Miocene of Saghalien & Spitzbergen
Acer dubium, n. sp.	×	....	....	....	....	....	....	....	....	....	....	....	....
Alnites curta, Dn.	×	....	....	....	....	....	....	....	....	×	....	....	....
Aralia notata, Lx.	×	....	....	×	×	×	....	×	....	....	....	....	....
Betula Stevensoni, Lx.	×	....	×	....	....	....	....	....	....	....	....	....	....
Castanea castaneæfolia, (Ung.) Kn.	×	....	....	....	....	....	....	×	....	....	×	×	....
Glyptostrobus europæus, (Brongn.) Heer.	×	....	....	....	....	×	×	×	×	....	×	....	....
Nelumbium pygmæum, Dn.	×	....	....	....	....	....	....	....	....	×	....	....	....
Pinus trunculus, Dn.	×	....	....	....	....	....	....	....	....	×	....	....	....
Planera longifolia, Lx.	×	....	....	....	....	....	×	....	....	×	....	....	....
Sequoia Langsdorfii, (Brgt.) Heer.	×	×	....	....	....	×	×	×	....	×	×	....	....
Taxodium distichum miocenum, Heer.	×	....	....	....	....	×	....	×	×	×	×	×	....
Pseudotsuga miocena, n, sp	×	....	....	....	....	....	....	....	....	....	....	....	....

This list of plants is much too limited to be employed as a definite basis for conclusions relative to the age of the deposit, but an analysis of the foregoing table shows that in point of distribution, the plants are considerably more abundant in the Eocene (56·66 per cent) than in the Miocene (40·00 per cent). On the other hand, there are no species which are exclusively Cretaceous, but there are 2 per cent which are exclusively Eocene and 3 per cent exclusively Miocene. Seven species in all occur in the Eocene, while eight species occur in the Miocene. Out of a total of ten species, 10 per cent occur also in the Cretaceous and 40 per cent occur also in the Eocene. So far then, as this evidence goes, it seems to indicate the Miocene age of the formation on the Horsefly River.

EXPLANATION OF THE FIGURES.

Plates VII.-XVI.

Fig. 1.—Osmunda skidegatensis. Transverse section of the stipe. x 29.

Fig. 2.— .. ..Transverse section of the outer cortex. x 180.

Fig. 3.—.. .. ..Transverse section of the inner coxtex. x 180.

Fig. 4.—Todea barbara. Transverse section of the stipe. x 29.

Fig. 5.—Osmunda skidegatensis. Transverse section of stipe, showing details of the stele. x 42.

Fig. 6.—.. .. .. Transverse section of the stele, showing details of the xylem region, and obliteration of the parenchyma in the phloem and xylem regions. x 180.

Fig. 7.—Todea barbara. Transverse section of the stipe, showing details of the stele for comparison with fig. 6. x 56.

Fig. 8.—Osmunda skidegatensis. Longitudinal section of the stipe, showing cortical parenchyma, two regions of phloem parenchyma with abundant mucilage globules, and a central region embracing the xylem. x 29.

Fig. 9.—.. .. .. Longitudinal section of the stipe, showing the structure of the inner cortex, the region of the phloem parenchyma with abundant mucilage globules, the phloem region and scalariform vessels of the xylem. x 55.

Fig. 10.—.. .. .. Longitudinal section through the xylem, showing the structure of the scalariform vessels. x 180.

Fig. 11.—Ginkgo pusilla. Transverse section of the wood. x 61.

Fig. 12.—.. .. .. Radial section of the wood. x 180.

Fig. 13.—.. .. .. Tangential section of the wood. x 180.

Fig. 14.—Sequoia langsdorfii. Transverse section of the wood. x 55.

Fig. 15.—.. .. .. Radial section of the wood. x 55.

Fig. 16.—.. .. .. Tangential section of the wood. x 55.

Fig. 17.—Pseudotsuga miocena. Transverse section of the stem. x 55.

Fig. 18.—.. .. .. Radial section of stem. x 170.

Fig. 19.—.. .. .. Tangential section of stem, showing uniseriate rays. x 170.

Fig. 20.—.. .. .. Tangential section, showing character of the fusiform rays. x 170.

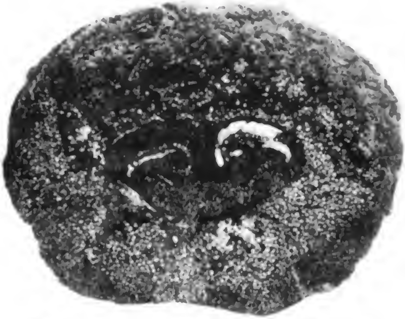


FIG. 1.—OSMUNDITES SKIDEGATENSIS. x 29.

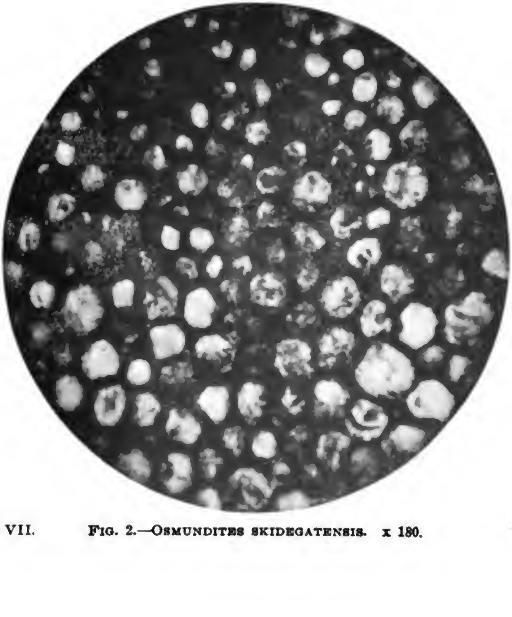


PLATE VII. FIG. 2.—OSMUNDITES SKIDEGATENSIS. x 180.

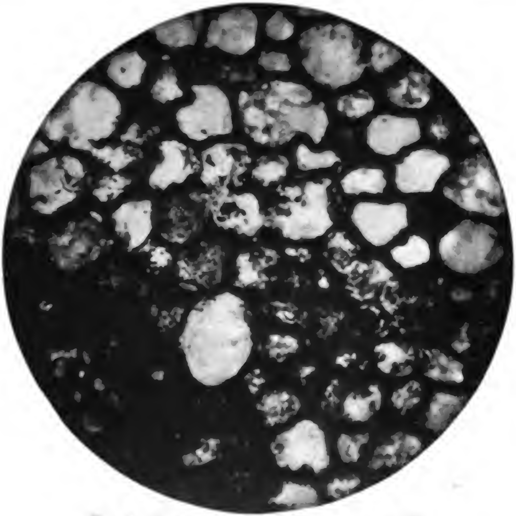


FIG. 3.—OSMUNDITES SKIDEGATENSIS. x 180.

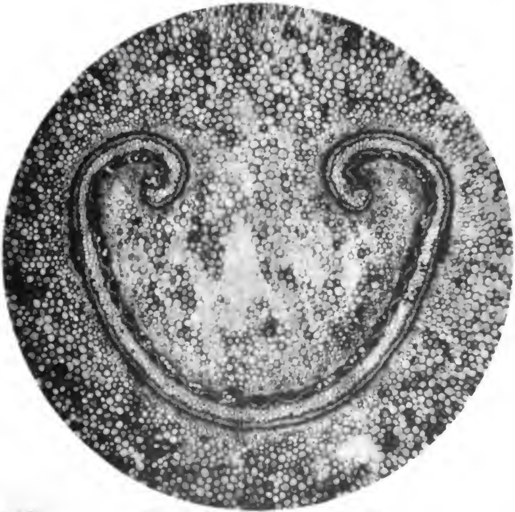


PLATE VIII. FIG. 4.—TODEA BARBARA. x 29.

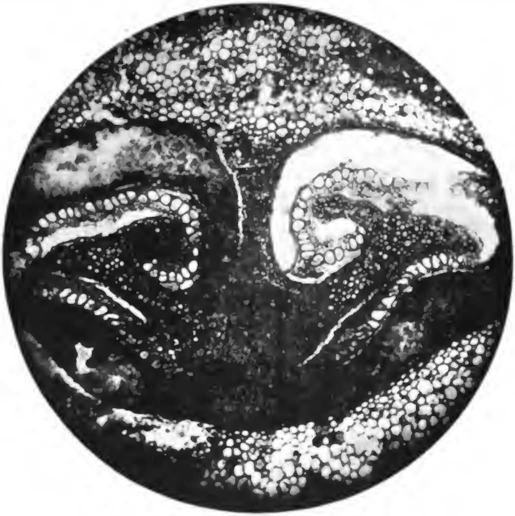


FIG. 5.—OSMUNDITES SKIDEGATENSIS. x 42.

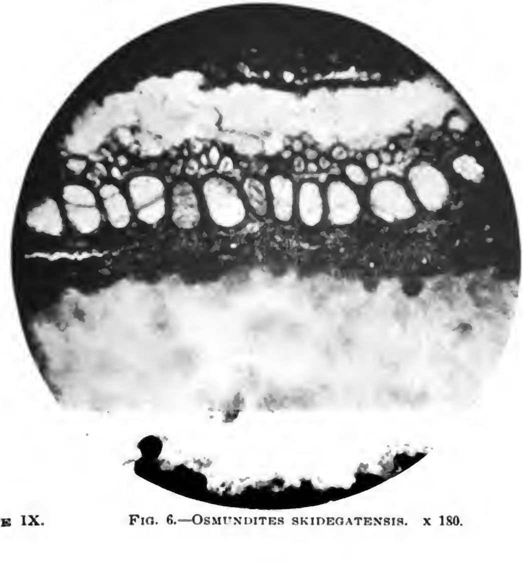


PLATE IX. FIG. 6.—OSMUNDITES SKIDEGATENSIS. x 180.

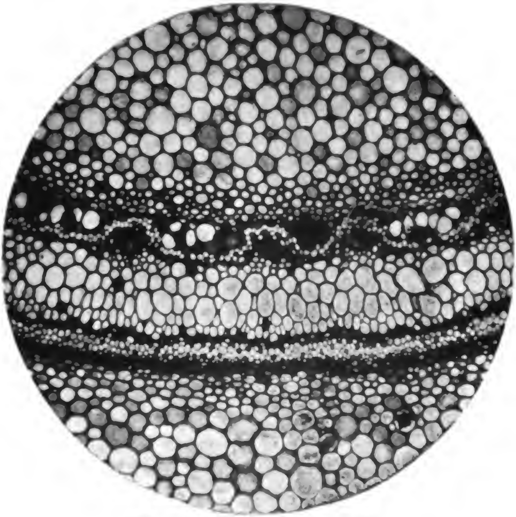


FIG. 7.—TODEA BARBARA. x 56.

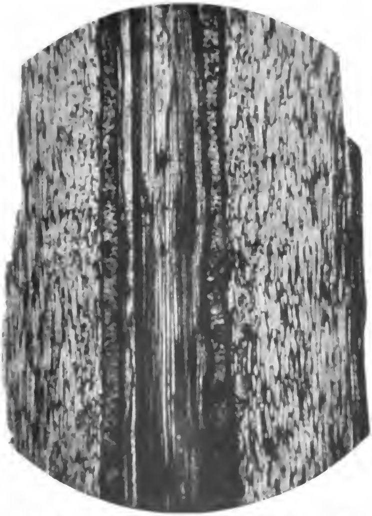


PLATE X. FIG. 8.—OSMUNDITES SKIDEGATENSIS. x 29.

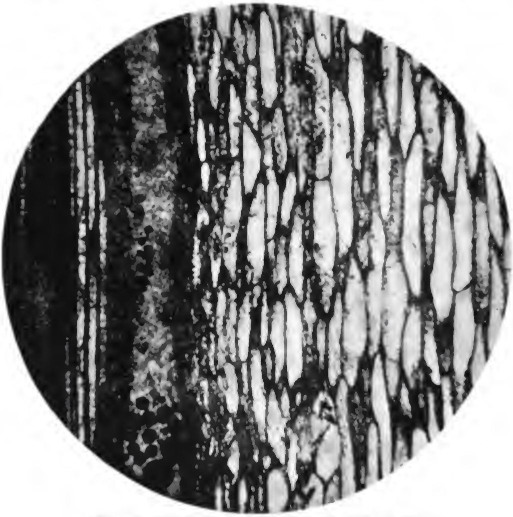


FIG. 9.—OSMUNDITES SKIDEGATENSIS. x 55.

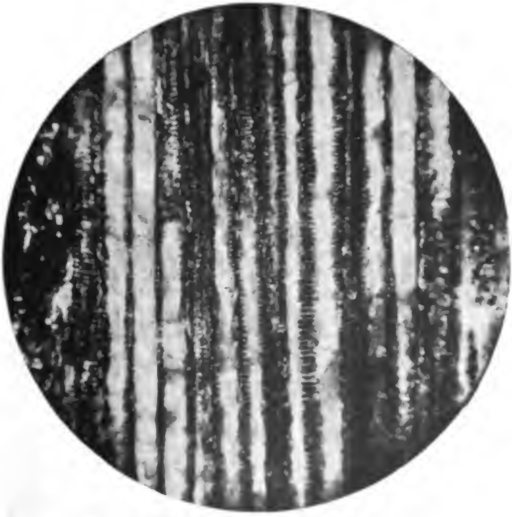


PLATE XI. FIG. 10.—OSMUNDITES SKIDEGATENSIS. x 180.

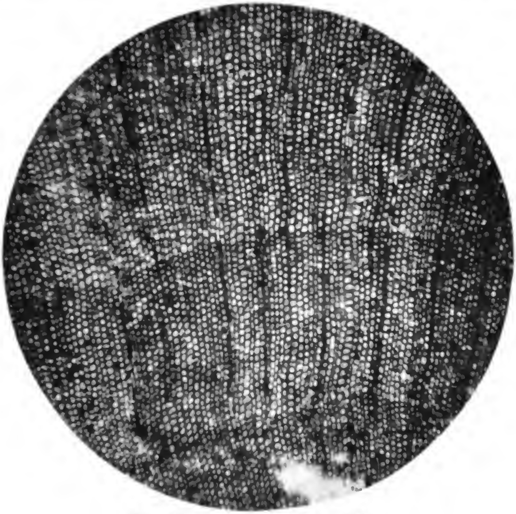


FIG. 11.—GINKGO PUSILLA. x 61.

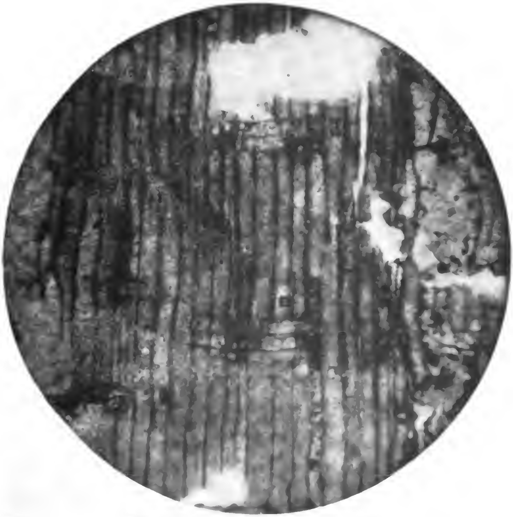


PLATE XII. FIG. 12.—GINKGO PUSILLA. x 180.

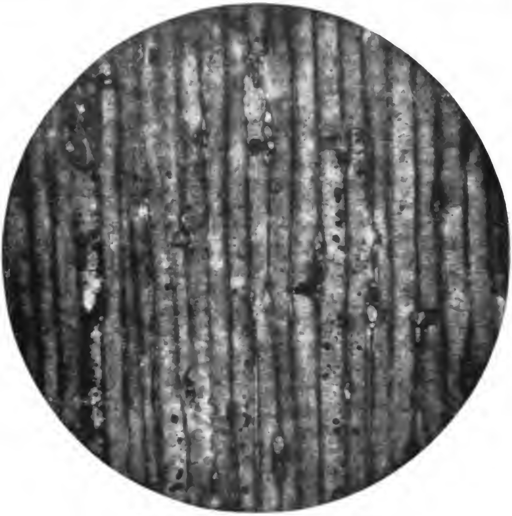


FIG. 13.—GINKGO PUSILLA. x 180.

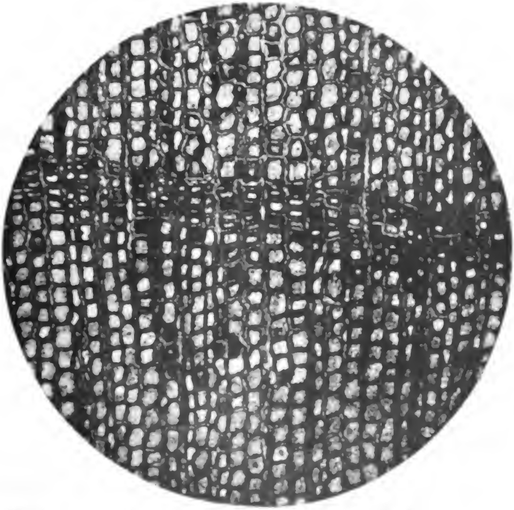


PLATE XIII. FIG. 14.—SEQUOIA LANGSDORFII. x 55.

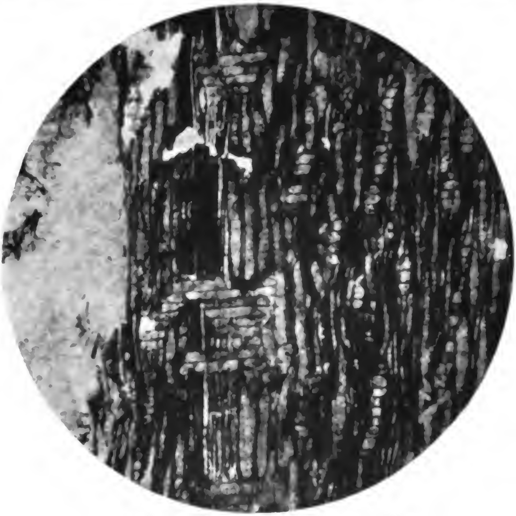


FIG. 15.—SEQUOIA LANGSDORFII. x 55.

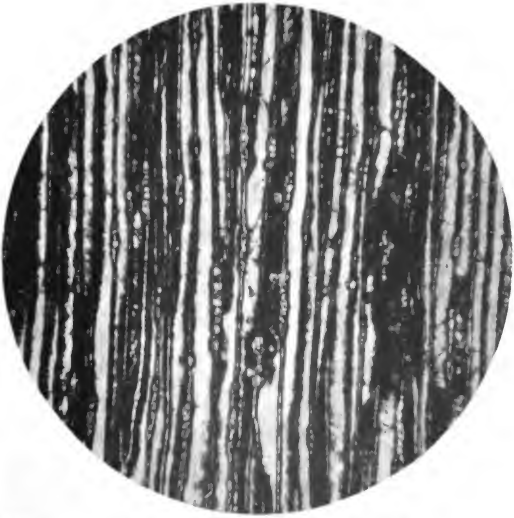


PLATE XIV. FIG. 16.—SEQUOIA LANGSDORFII. x 55.

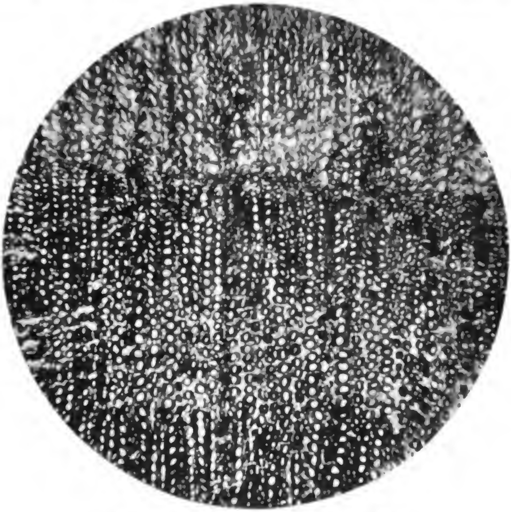


FIG. 17.—PSEUDOTSUGA MIOCENA. x 58.

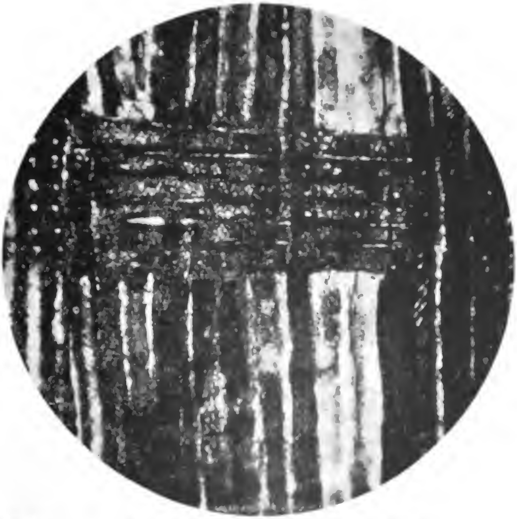


PLATE XV. FIG. 18.—PSEUDOTSUGA MIOCENA. x 170.

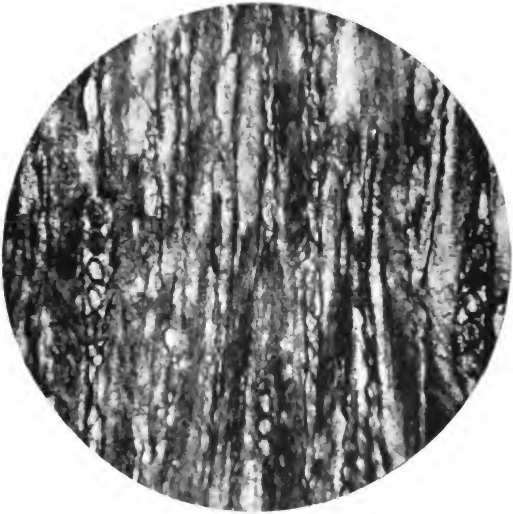


FIG. 19.—PSEUDOTSUGA MIOCENA. x 170.

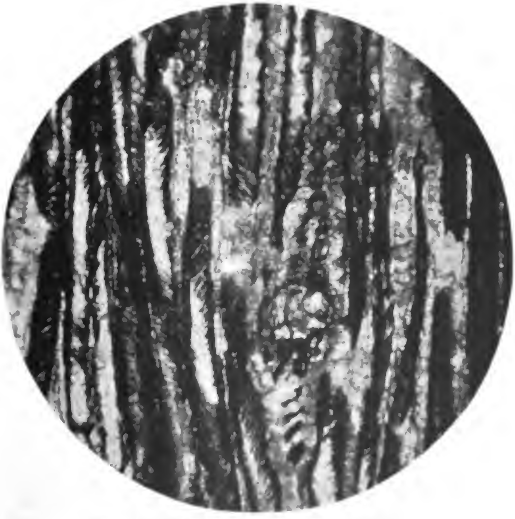


PLATE XVI. FIG. 20.—PSEUDOTSUGA MIOCENA. x 170.

III.—*Notes on Cambrian Faunas.*

By G. F. MATTHEW, LL.D.

Earlier "notes" were published in these Transactions in 1897-98 and '99.

(Read May 27, 1902.)

No. 5. OBOLOID SHELLS OF THE CAMBRIAN SYSTEM IN CANADA AND THEIR RELATIONSHIP.

Much has been done of late years to make known to us the type of Eichwald's genus Obolus, and especially through the monograph on this genus prepared by Michwitz. Through his writings we now know the main points of the internal anatomy of that genus as presented in the type species *O. Apollonis* and its variety *Quenstedti*, and can see how easily it might be misunderstood from the older representations of its form and internal features.

Depending, as the palæontologists have had to in the first case, on external features as the means of determining the genus, a number of species have been referred to Obolus, which, when better known, were found to exhibit important points of difference, these were chiefly in the moulding of the interior surface of the valves.

Of this moulding of the interior, the most distinctive markings are those which indicate the points of attachment of the muscles that move the valves, and the impressions of the main trunks of the circulatory system. Much variation was found in these two sets of markings, showing radical differences in the arrangement of the internal parts of the animal. Yet the more obvious characters of the external form, and the surface markings of the valves, are those which must necessarily first be used in assigning the species to its genus.

We propose in this brief note to point out some distinctions which have been made out from a knowledge of the internal characters of the shells of the Oboli of the Cambrian System in Canada; and indicate some possible relations to other genera of shells that have been assigned to the genus Obolus.

The species are referred to in succession, taking the oldest first, and continuing with those that are found in successively higher horizons in the Cambrian.

OBOLUS TORRENTIS (Plate 1, fig. 1).[1]

This species, found in the shales enclosed in the volcanic rocks of the base of the Cambrian, is referred to the genus only on the basis of general form. The internal moulding of the shell is not known, but the depressed band on the median line of dorsal valve indicates a relationship to the following species:

OBOLUS TRIPARILIS (Plate 1, fig. 2).

This species from the base of the Lower Etcheminian, is easily distinct from the type of the genus by the advanced position of the anterior adductors of the dorsal valve, and the close association with them of the "*j*" laterals. In *O. Apollonis* the first named muscles are wide apart and the "*j*" laterals are far in advance of them. There is also in the Etcheminian form a small scar between these laterals from which, with them, the species takes its name. Of this scar the cause is not known, but in size and appearance it resembles those made by the "*j*" laterals.

OBOLUS DISCUS (Plate 1, fig. 3).

This form by the arrangement of the central group of muscles and the sculpture shows it relation to the preceding. It is larger and more orbicular.

OBOLUS ÆQUIPUTEIS (Plate 1, fig. 4).

This Obolus also has the two pairs of scars of the central muscles of the dorsal valve, approximated, but the supposed "*j*" laterals are unusually large. It also has the small median scar that is found in the other two. The three form a series of closely related forms (EOOBOLUS).

OBOLUS LENS-PRIMUS.

This small Obolus is the initial form of a quite different series. The preceding three have the vascular trunks of the ventral valve wide apart as in *Obolus Apollonis*. In the series of which *O. lens-primus* is the oldest known form, the vascular trunks of this valve are approximated so as to resemble those of the Lingulepis. They may even be so close together as to enclose only a third of the area of the valve.

---

[1] The full description of this and the three following new species will be found in the author's report to the Director of the Geological Survey of Canada, on the Cambrian Rocks of Cape Breton.

The amount of chitinous matter in the valves of the species of this group is small, and the outer shell may have been calcareous. As preserved in the shales of the Cape Breton Cambrian, it is translucent and apparently silicious. These shells may be related to Obolella.

OBOLUS LENS (Plate 1, fig. 6).

This form is considerably larger than the preceding, and, like it, has regular concentric ridges on the surface. In this character they differ from the Oboli of the Lower Etcheminian, which have a surface ornamentation of waving irregular ridges.

OBOLUS BRETONENSIS (Plate 1, fig. 5).

The preceding species is found both above and below this one; the former is found in fine sandy shale, but the present species affected a mud in which clay was more plentiful. This species had more prominent and more widely set concentric ridges on the surface than the preceding.

These three forms belong to the section PALÆOBOLUS, characterized by approximated vascular trunks.

In the base of this division of the Etcheminian is a large Obolus, whose characters are not sufficiently known to enable us to use it in this comparison (*O? major*).

OBOLUS PULCHER (Plate 1, fig. 7).

In the base of the St. John group another Obolus appears, of a type quite different from either of the preceding. It is easily recognized by the peculiar ornamentation of cancellated ridges, resembling those of *Iphidea pannula.* The dorsal, by its incurved and flattened posterior slope, and its internal markings, shows a resemblance to the markings of Acrothele, and the beak of the ventral is more prominent than is usual in Obolus; but it is not pushed forward as in Acrothele, nor is the cardinal area visible from above.

One peculiar feature of this species is the larger size and fan-like form of the callus of the ventral valve; in this point it resembles some of the Orthids. The callus extends beyond the middle of the valve, and shows that in the ventral valve of this species, the central muscles were far forward. This is referred to the subgenus BOTSFORDIA.

OBOLUS PRISTINUS (Plate 1, fig. 8).

Nearly cotemporaneous with the last is a somewhat larger species, which, if the markings are interpreted aright, has similarly advanced centrals in the ventral valve, but the anterior adductors of the dorsal are unusually far back. This is counterbalanced by the position of the "*j*" laterals which are only ¼ of the length of the valve from the front. The surface markings are fine and more like later than earlier species.

The Paradoxides beds, though containing a varied fauna and several genera of Brachiopoda, shows hardly a single example of Obolus; this is especially true of the Lower Paradoxides beds, where the bulk of the fauna is found.

OBOLUS ELLA (Plate 1, fig. 9).

This form, formerly referred to Lingulella, is decidedly Oboloid in shape. It differs from the type in the backward position of the "*j*" laterals of the dorsal valve; also the anterior adductors of this valve are set further back than in *O. Apollonis*. Mr. Walcott's reference of it to Westonia would also indicate that the sculpturing of the surface of the valves differs from that of Eichwald's species.

OBOLUS REFULGENS (Plate 1, fig. 11).

This species is very near the geological horizon of *Obolus Apollonis*, but lived in a different habitat. The latter species abounded in sandstone beds, but the former in fine dark gray shales or mud-beds. Being very thin, the internal markings of the valves of *O. refulgens* are faint, and it is only lately that specimens have been found which show that it is not a typical Obolus. In Obolus proper (Euobolus) the scars of the anterior adductors of the dorsal valve are separated far from each other, but in this species they are closely approximated; they are closer together than those of Lingulella, and are parallelled only by those of *Monobolina*, Salter. *Lingulella Davisii*, which is nearly contemporary with these two forms, is intermediate between them as regards the approximation of these two muscle scars.

From an examination of the internal features of the valves of the several species of Obolus, which the author has briefly outlined above, the reference of these species to that genus, taking *O. Apollonis* as the type, is evidently open to question; the arrangement of the muscle scars and of the vascular trunks, relates them to other genera rather than to Obolus, as typified by the species above named. For this reason we have felt it necessary to propose sub-generic names to indicate these important differences.

The oldest group (Eoobolus) differs from the type in the advanced position of the whole group of the central muscles of the dorsal valve; not the "*j*" laterals alone.

The second group (Palæobolus differs in the approximation of the vascular trunks of the ventral valve, which enclose only a third of the area of the valve, whereas in *O. Apollonis* one-half of the surface is thus enclosed.

The third group (Botsfordia) differs in the close grouping of the central scars of the dorsal valve, and the posterior position of the lateral scars. Also in the very large callus of the ventral valve.

The fourth group represented by *Obolus pristinus* is different by the arrangement of the scars from any of the preceding, and also by its sculpture. It is, perhaps, on the line of development of *Obolus Ella* which Mr. Walcott, on account of its surface, has referred to his subgenus Westonia; it, however, has no resemblance to Westonia in its surface-markings, and the "*j*" laterals of the dorsal are much farther forward.

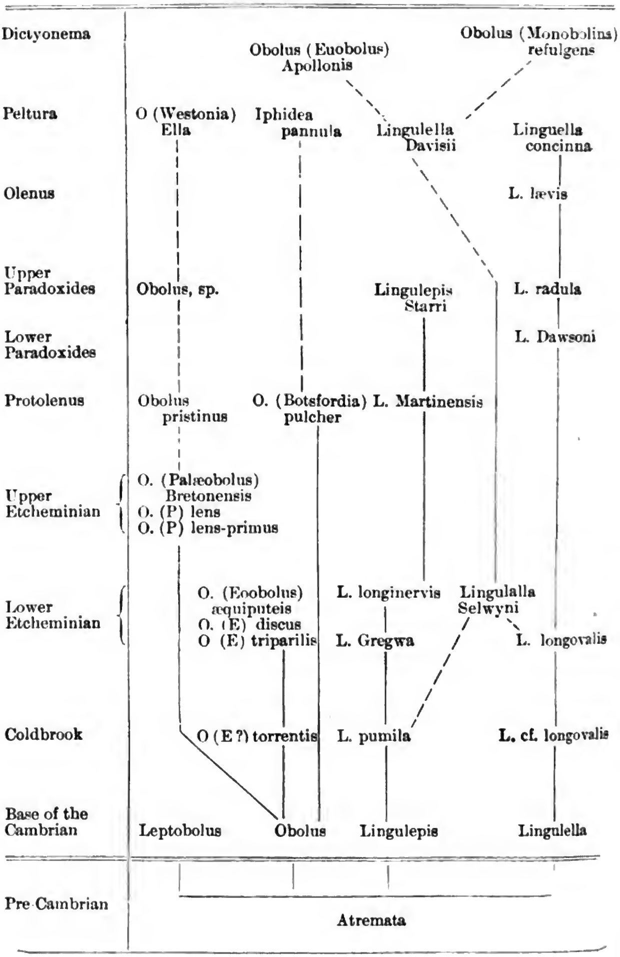
The fifth group (Monobolina) differs from the type in the close approximation of the anterior adductors of the dorsal valve.

There are also differences in the sculpture.— In the first group (Eoobolus) this consists of close, fine irregular waving concentric ridges. In the second (Palæobolus), of stronger and more regularly concentric ridges. In the third (Botsfordia), of cancellated ridges, forming a marked pattern. In the fourth, of fine concentric ridges, irregular in their elevation and prominence. In the fifth (Monobolina), in very fine and regular concentric ridges.

The following table is an attempt to show graphically the possible relations of the several species to each other, and to other genera, and subgenera of the Cambrian system.

The table shows the horizon in the Cambrian at which each of the species appeared in Eastern Canada, with some references to other species occurring outside that region.

CONJECTURAL LINES OF DESCENT OF THE CANADIAN OBOLI, WITH REFERENCES TO THE OLDEST KNOWN ATREMATA. THE ZONAL HORIZONS OF THE SEVERAL SPECIES ARE SHOWN IN THE MARGIN.



No. 6. DEVELOPMENT IN SIZE OF THE INARTICULATE BRACHIOPODS OF THE BASAL CAMBRIAN.

In comparing the Brachiopods of the Coldbrook Terrane (Base of the Cambrian) with resembling forms of the next terrane above, the writer observed that in all the genera the resembling forms were larger. This had been found to hold in the genus Acrotreta, which in the range of time from the beginning of the Cambrian to the Lower Ordovician increased considerably in the height of the ventral valve, and also in the bulk of the valves generally.

That this enlargement of the valves did not affect one genus only, but was notable in several, seems to indicate that there is a law of general application in the development of the Brachiopoda in this direction, such as is seen to have acted in the case of the Horse and of other Tertiary Mammalia.

Owing to the smallness of these early Brachiopods this peculiarity in the forms of the successive faunas is easily overlooked, but in reality the change of bulk is quite noticeable, and in some cases is nearly as great as that observed in the species counted in the descent of the Horse from Hyracotherium to the modern Horse.

The enlargement of the species of Acrotreta from the first that appeared in the base of the Cambrian to their culmination in Ordovician Time is described in some detail in a paper by the writer, contributed to the Bulletin of the Natural History Society of New Brunswick, last year.

INCREASE IN SIZE OF THE VENTRAL VALVES OF ACROTRETA IN THE CAMBRIAN AND LOWER ORDOVICIAN.

TERRANE OR ASSISE	NAME	Length	Width	Proportion to height	Area
		mm	mm		
Coldbrook terrane........	A. papillata-prima	2	2¼	2·	5·
Lower Etcheminian.......	A. papillata.......	2½	3	2·4	7·5
Upper Paradoxides	A. socialis, v. Seeb......	3	3	1·5	9·
Dolgelly Group...........	A. bisecta...............	3	3¼	1·3	9·75
Llandeilo Group..........	A. subconica, Kutorga..	4	4	·85	16·
Increase of the latest beyond the first	....	....	....	.. ... .	3·2

In this table, the third column shows the proportion of the width to the height of the valve, from which it will be seen that the ventral valve became proportionally higher as time went on.

It is conceivable that if we could follow the series in the phylum of Acrotreta farther back in time, we would meet valves in which the umbo would be no higher than in Acrothele or Linnarssonia; or even until the umbo came down to the plane of the edges of the valve.

The fourth column represents the area of the opening of the valve, assuming it to be square, which, of course, it is not; but the extra third is left as an offset to the "third dimension," viz., the height, which is not shown in this and the following tables. This column is intended, therefore, to represent the *bulk* of the shell. In the case of Acrotreta it may be gathered from this table that the Ordovician Acrotretas had attained three times the bulk of the species that appeared at the beginning of Cambrian time. This then is the result of the observations already made on the genus Acrotreta.

Let me see how far this result is borne out by observations on other genera.

Several genera of Brachiopods are known to have appeared simultaneously in the base of the Cambrian in the Acadian provinces of Canada. These are:

Acrothyra.
Acrotreta.
Leptobolus.
Lingulepis.
Lingulella.
Obolus.

On comparing the species of these genera which appeared in the Coldbrook or lowest terrane, with the species in the next terrane which they most resemble, a decided, though not very great increase in bulk, is observable. This will be seen by the following table:

COLDBROOK TERRANE				ETCHEMIN TERRANE				
SPECIES AND MUTATIONS	Length	Width	Area	SPECIES	Length	Width	Area	Assise
	mm	mm			mm	mm		
Acrothyra signata-prima....	2	2½	4·50	**A. signata**........	2	3	6·	E. 1*b*
Acrotreta, papillata prima..	2	2½	5·00	**A. papillata.**	2½	2½	6·25	E. 3*d*
Leptobolus, torrentis........	3	2	6·00	**L. atavus**.........	5	3½	17·50	E. 3*e*
Lingulepis pumila	6	4½	27·	**L. longinervis**	11	8	88	E. 2*b*
Linguella, c.f. longovalis....	7½	5	37·5	**L. longovalis**	9	6	54	E. 1*e*
Obolus torrentis............	6	6	36·	**O. triparilis**.... ..	9	8	72·	E. 1*b*

A circumstance affecting this comparison is that more abundant collections were made from the Etchemin terrane than from the Coldbrook, and as the size of the largest valves is recorded in the description of the species, this would give the Etchemin species an advantage as regards comparative size. But even after eliminating this possible occasion of a greater than the natural difference, there remains enough variation to prove an increase in size of the Brachiopods as time went on.

For the purpose of checking this result, an examination was made more in detail of the last four of the genera named above, as they are represented by species in the Etcheminian terrane, from which it will be seen that an increase in size is noticeable in all these genera, as they pass through the Etchemin terrane. The assise where each species occurs is given in the margin of the following table. The assises occur in the following order from below upward, the Coldbrook being the lower terrane.

Co: Fossiliferous Shale of the			Coldbrook Terrane
E. 1 *a*	Division 1	Lower Fauna	Etchemin Terrane
E. 1 *b*			
E. 1 *c*			
E. 1 *d*			
E. 1 *e*			
E. 2 *a*	Division 2		
E. 2 *b*			
E. 2 *c*			
E. 3 *a*	Division 3	Upper Fauna	
E. 3 *b*			
E. 3 *c*			
E. 3 *d*			
E. 3 *e*			
E. 3 *f*			

The fauna of the two lower divisions of the Etcheminian is distinct by its species from that of the upper division, and to some extent also by the genera.

LEPTOBOLUS.

This is represented by two phyla in one of which the species are diminutive, tumid, long-oval, thin shelled brachiopods with the vascular trunks close to the margins. In the other phylum (*L. collicia, etc.*) the species are somewhat larger and the margins of the valves flatter. It is the first phylum which is considered here.

VALVES OF THE SMALLER LEPTOBOLI OF THE ETCHEMIN TERRANE, SHOWING THE INCREASE IN SIZE FROM THEIR FIRST APPEARANCE ONWARD.

Assise	NAME	Length	Width	Proportion	Area
Co :	Leptobolus torrentis[1].....	mm 3·	mm 2·	1·5	6·
E. 1 *d*	L........ . tritavus	3·8	2·4	1·6	9·1
E. 2 *a* (?)	L.......... insulæ	4·2	2·3	1 8	9·7
E. 3 *d*	L.......... atavus.........	5·7	3·1	1·84	17·7
E. 3 *e*	L.......... atavus......................	4·8	3·1	1·55	14·9
	Increase of the latest beyond the first..	....	....	....	2·5

LINGULEPIS.

Under this generic name there are at least two phyla. One presenting small, thick shelled species, the other of larger species (*L. Gregwa, etc.*), that appeared in the principal mudbed of the Lower Etchemin fauna, and has not been met with higher up; for no Lingulepis is yet known in the Upper Etchemin Fauna. The phylum of small forms is here presented:

VALVES OF THE SMALLER LINGULEPIDES OF THE ETCHEMIN TERRANE, SHOWING THE INCREASE IN SIZE FROM THEIR FIRST APPEARANCE ONWARD.

Assise	NAME.	Length	Width	Proportion	Area
Co .	Lingulepis pumila......................	mm 6	mm 4½	1·33	27·
E. 1 *d*	L.......... Gregwa-robusta............	10½	7½	1·64	78.75
E. 2 *b*	L.......... longinervis.................	11	8	1·38	88·
	Increase of the latest beyond the first..	....	....	....	3·3

---

[1] A full description of this and other new species of Cambrian fossils in these tables will be found in the writer's Report to the Director of the Geological Survey of Canada on the Cambrian Rocks of Cape Breton.

LINGULELLA.

The Lingulellas of these lower Cambrian Zones are none of them typical, that is they have not the "satchel shape" form characterizing the type of the genus, *L. Davisii,* of the Upper Cambrian. Those that are treated of here belong to a phylum of oval forms which are found at intervals throughout the Cambrian system. The Lingulepides just cited are perhaps nearer Lingulella-typical, than the species named below.

VALVES OF OVAL LINGULELLÆ OF THE ETCHEMIN TERRANE, SHOWING INCREASE IN SIZE FROM THEIR FIRST APPEARANCE ONWARD.

Assise	NAME	Length	Width	Proportion	Area
Co :	Lingulella cf. longovalis	7½	5	1·50	37·50
E. 1 *c*	L. .... longovalis	8	5	1·60	40·
E. 1 *e*	L. .... longovalis	9	6	1·50	54·
	Increase of the latest beyond the first.	....	....	....	1·5

The increase in area is only one-half above the first integer; but then the range in time was short, viz.: Coldbrook and one-half of the Lower Etchemin Fauna.

OBOLUS.

Here is a complex group in which several phyla are involved:

SIZE OF VALVES OF THE OBOLI AS THE SPECIES SUCCEED EACH OTHER IN THE ETCHEMIN TERRANE.

Assise	NAME	Length	Width	Proportion	Area
Co :	Obolus torrentis.	6	5	·83	30·
E. 1 *b*	O...... triparilis	9	8	·88	72·
E. 1 *e*	O...... discus	9½	9	·85	85·5
E. 2 (*a?*)	O...... æquiputeis	12	11	·92	132·
E. 3 *b & e*	O ..... lens.	14	12	·86	168·
E. 3 *d*	O...... Bretonensis	15	17	1·13	255·
	Increase of the latest beyond the first.	....	....	....	8.5
				or	4.4

In this series there are at least two phyla. The interior of *O. torrentis* is unknown, but the next three are characterized by the equality and regular arrangement of the central scars of the dorsal valve (including the anterior laterals), and by the possession of a small scar in the middle of this group of muscles.. The first phylum may be regarded as running through the Coldbrook and Lower Etchemin Faunas, and to have increased four fold in that time; or, if one should omit the Coldbrook species, they doubled in size.

The series of Oboli as a whole increased eight fold; but the two species of the Upper Etcheminian are of a different phylum, one especially, *O. Bretonensis*, was separate, if one may judge by the unusual course of the vascular trunks of the ventral valve, which, for an Obolus, are very close together. The two species of this fauna (*O. lens* and *O. Bretonensis*) have a similar sculpture, and are likely to be from the same root form.

As a result of this enquiry one may present the following condensed statement:

Range in Time.	NAME OF THE GENUS OR PHYLUM FROM WHICH THE FORMS HAVE SPRUNG				Number of integers of increase of bulk of the latest species beyond the first.
Entire Cambrian ..	Acrotreta,	earliest	species.	A. papillata prima	3·2
Basal Cambrian ...	Leptobolus,	"	"	L. torrentis.......	2·5
Includes Lower Etchemin........	Lingulepis,	"	"	L. pumila.........	3·3
Same, or for 4·3 rate Basal Cambrian..	Lingulella,	"	"	L. cf. longovalis ..	4·3 or 1·5
Lower Etchemin inclusive.........	Obolus,	"	"	O torrentis.......	4·4
Basal Cambrian as a whole........	Obolus, as a genus, based on form..........				8·5

ACROTHYRA.

As a contrast to this result we present the variations traceable in the genus Acrothyra, from its earliest known appearance to the latest form, of which we have positive knowledge. This covers the whole of the Basal Cambrian time.

SIZE OF VENTRAL VALVES OF ACROTHYRA FROM THEIR FIRST APPEARANCE TO THE TOP OF THE BASAL CAMBRIAN.

Assise	NAME	Length	Width	Depth	Proportion	Area
		mm	mm	mm		
Co:	A. signata-prima..............	2½	2½	1¼	2·	6·25
E. 1 *b*	A. signata (type).....................	3	2	1	2·	6·
E. 1 *c*	A......... sera..........................	2½	2½	1½	1·7	6·25
E. 1 *d*	A......... tarda..........................	2½	3	1½	2·	7·5
E. 2 *c*	A......... orta..........................	2	1¾	1½	1·2	3·5
E. 3 *a*	A. proavia-prima......................	3	2	2	1·	6·
E. 3 *e*	A......... crassa........................	2½	2	1½	1·3	5·
E. 3 *e*	A. proavia (type)......................	3	2	1½	1·3	6·
	Increase of the latest beyond the first....	......	......	......	......	·95

An increase in the elevation of the ventral valve (see fourth column) is quite as noticeable in this genus as in Acrotreta as it is found in the Basal Cambrian; but so far as bulk of the valve is concerned the two genera differ, for Acrothyra shows no increase, but on the contrary, if anything, a reduction in bulk. It would seem to have been a closed type, which had reached its culmination and was not capable of further development.

No. 7. DID THE UPPER ETCHEMINIAN FAUNA INVADE EASTERN CANADA FROM THE SOUTHEAST?

Some years ago, when president of Section IV. of this Society, the writer had the honour of asking the attention of the members of this section to certain conditions of the fauna and sediments of the early Palæozoic in the North Atlantic region, that seemed to indicate the manner of the migration of animal species at certain times from one side of the Atlantic to the other; the faunas in some cases being borne from Europe to America, and in others from the latter continent to Europe.

These conjectures in regard to the migration of species were based largely on the known spread of the genera from certain provinces where the faunas were in full force, to others where they were represented by a limited number of species.

For instance, the Paradoxides fauna, of which Anopolinus is a member, appeared to have its headquarters in Northern Europe, for there not only does it have the greatest variety of genera, but it also shows the most continuous chronological suceession. Anopolinus, while it is found in Scandinavia and Britain and extends as far west as Newfoundland, has not been found in Canada. And the species of Paradoxides abundant in Europe and well represented as far as Maritime Canada, is reduced to one species (or two) in Massachusetts, and west of this is unknown.

A representative form of one species of this fauna, a *Liostracus* (the *Conocephalites tener* of Hartt), which we had thought to be peculiarly American, was sent to me this summer from the south of France, by Mons. Jean Miquel, it thus also proves to be European, but belongs in the southern facies of this fauna, represented in *Paradoxides rugulosus* and the associate species. The American fauna of Paradoxides thus drew its representatives from both the northern and southern provinces in Europe. It would be an instructive study to ascertain how and why the northern fauna of Paradoxides prevailed over the southern in Maritime Canada, and what held the Upper Fauna of

Paradoxides there, while the Olenus fauna was being developed in Europe.

In the article on the distribution of the Cambrian Faunas above referred to, the present writer ventured to suggest that the fauna of the Utica slate was a cold deep-water fauna, swept in upon America from the North Atlantic region. Since then R. Rudemaun, the talented Assistant Palæontologist of the New York State survey, has found proof of the existence of such a current from the northeast prevailing over northeastern New York in Utica times. This he has demonstrated by observations on the attitude of colonies of graptolites entombed in the Utica shale in that region.

In the present author's article above cited, it was also inferred that the central part of North America was the headquarters of the Olenellus fauna, because it was there represented by a variety of species, whereas in Europe the fauna where it had been found consisted of only a few species, stragglers from the main swarm. The argument in reference to the Paradoxides fauna would imply a reversed current in the time of the Olenellus fauna, viz.: one flowing to the northeast, and carrying with it the migrating young of the Benthos. A possible confirmation of this view is found in the attitude of the entombed shells of the Etcheminian faunas in Cape Breton, especially the Upper fauna.

In the Upper Etcheminian fauna the orientation of its Brachiopods to the northeast is of a very marked character, indicating a current setting to the northeast along the Cambrian shore during the time of the entombment of the Upper Etcheminian fauna.

In the Lower Etcheminian the orientation is more capricious, some beds showing it distinctly and others not at all. But in the fossils of the Upper fauna it is very conspicuous in many of the layers. Sometimes as many as eighty per cent. of the valves are turned in the direction of the current. This would indicate a steady flow of water setting to the northeast during the time of the entombment of the Upper Etcheminian fauna.

It is in accordance with this that the fauna changed suddenly at the beginning of this time, a new set of species, and one new genus appearing among the Brachiopods. There was also a change in the kind of sediment deposited, as hard massive sandstones gave place to more flaggy beds and shales.

It does not seem likely that the phenomenon of orientation to the northeast was due to tidal action, for in the valley where this feature is most noticeable, the beds in which it was observed thicken to the southwest, indicating that the opening of the bay was in that direction. Burials in tidal mud would occur in largest numbers at the recession of the tide, and the valves would have been oriented to the southwest, whereas these valves have just the opposite direction.

If then the burial of the shells was not by tidal mud but through sediment carried on a continuous marine current, this current undoubtedly set steadily to the northeast. The nature of the sediment which it carried and the species of fossils entombed by it, show that it was a shore current. Whether the currents of the open ocean set in the same direction, or not, there is no evidence to show. This may have had a reversed direction, just as the Gulf stream is complimentary to the Arctic current along the coast at the present day; but so far as the shore animals are concerned, these were subject to the conditions of transportation above inferred.

We as yet know nothing of the deep water animals of this time, which may have dwelt in a southwest current as did those of the Utica slate, and probably also those of the Paradoxides beds.

Full particulars of observations on the orientation of the Cape Breton Cambrian fossils are contained in the report on that region recently submitted by the writer to the Director of the Canadian Geological Survey.

No. 8. CAMBRIAN BRACHIOPODA AND MOLLUSCA OF MT. STEPHEN, B.C., WITH THE DESCRIPTION OF A NEW SPECIES OF METOPTOMA.

At the time that the trilobites of the Mt. Stephen fauna were reviewed by the author, the Brachipods were left, in hope that better material would come into his hands, than were found in the Walker collection. Since then, through the kindness of the late Director of the Geological Survey of Canada, opportunity was furnished to examine the collections that had been made for that survey by Messrs. McConnell and Ami. These gave some further material for study.

In this year, through the courtesy of the Director of the U. S. Geological Survey, I have seen the types of the species from Mt. Stephen described by him (except the Crania) and so am in a position to identify with some certainty the several Brachiopods collected by Mr. Walker and Dr. Ami.

Mr. Walcott, through the occurrence of several of the Mt. Stephen species in the Cambrian strata of central Nevada, correlates them with the fossils of a certain belt of shales that occurs in a section in that district.[1]

---

[1] Am. Jour. Sci., Vol. XXXVI., Sept., 1888.

He summarizes this section as follows :—

	FEET
1. Quartizite [at the top of which is the Olenellus fauna]......	350
2. Limestones and shales [at the top of which is the group of species corresponding to the Mt. Stephen Fauna]........	1,450
3. Massive limestones [in the upper part of which is the Dicellocephalus (Euloma-Niobe fauna, *fide* Brögger)]........	3,000
	4,800

By this section, the fauna corresponding to that of Mt. Stephen, is about 1,400 feet above the fauna of Olenellus in the same section.

At a later date than the publication of this section, Mr. Walcott described several of the Brachiopods of the Mt. Stephen Fauna, the characters of which, as described by him, are here given[1].

" LINGULELLA MACCONNELLI, n. sp."

" Shell subspatulate, height and breadth as 7 to 4½. Ventral valve subattenuate toward the apex; broadest midway, with the sides converging slightly toward the front, and rather rapidly toward the apex; front broadly rounded. Dorsal valve short, height and breadth subequal; the broad front is squarely rounded.

The specimens are somewhat flattened in the shale, but the rather strong shell preserves a moderate convexity. Surface marked by concentric striæ of growth and radiating longitudinal lines."

In the examples in my hands the concentric and radiating striæ above referred to are obscured by a minute granulation; and the radiations are much finer than the concentric lines. An example of the ventral and one of the dorsal valves, both small, were found in the Walker collection.

" CRANIA (?) COLUMBIANA, n. sp."

Is described by Mr. Walcott as follows:— " Shell, small circular, or slightly longer than wide; apex, central or nearly so. Surface marked by fine costæ, that radiate from the apex to the margin. Traces of fine spines appear about the margin. Diameter, 2 mm."

The generic reference is made on account of the surface characters being more like those of shells referred to Crania than to those of other genera. *Crania Grayi,* Davidson ; *Crania Lælia,* Hall. (24th Rep. N.Y. State Cab. Nat. Hist., p. 220, pl. 7, fig. 16.)."

---

[1] Proc. U.S. Nat. Mus., June, 1889.

There is no example of this form in the Walker or Canad. Surv. Collections.

"ACROTRETA GEMMA, var. DEPRESSA, n. var."

"The specimens from Mt. Stephen are relatively much lower and broader in proportion to the height than the typical forms of *A. gemma*. On this account they are considered as a variety."

Mr. Walcott writes to me to say that the dorsal which he referred to *Linnarssonia sagittalis* Salt, he now thinks to be the dorsal valve of of the above species.

In the Walker collection is a dorsal valve which, by its sharp median septum and other features, appears to be the dorsal valve of this Acrotreta; the species appears to be sufficiently distinct from *A. gemma* and may be called *A. depressa,* Walcott.

"ORTHISINA ALBERTA, n. sp."

"Shell transversely suboval, front broadly rounded; the straight hinge-line is shorter than the full breadth of the valve; the area of the ventral valve high, bent backward from the hinge-line, divided by a large foramen that is covered by a convex deltidium. The area of the dorsal valve slopes back at about a right angle to the valve. The broad short foramen appears to have been covered by a low deltidium.

Surface marked by radiating costæ five in the distance of 3 mm. on the frontal margin.

This species recalls *Orthis Lindströmi, Linrs.* from the Paradoxides zone of Sweden."

Examples from the Walker collection are not well preserved and show no further characters.

There is another Orthid in the Walker collection, with ribs much wider apart, but not in good preservation.

"KUTORGINA PROSPECTENSIS, Walc.,?"[1]

"A fragment of a species of Kutorgina, closely related to *K. prospectensis*, occurs on slate in association with *Ptychoparia Cordilleræ*. It not improbably represents a new species."

No example of this was found in the collections that passed under the writer's hands, all resembling specimens being referable to *Iphidea pannula.* (See below.)

---

[1] Am. Jour. Sci.. Vol. XXXVI., Sept., 1888, p. 166.

The following species appear not to have been in Mr. Walcott's collection, received from the Dr. Rominger.

IPHIDEA PANNULA, White sp.

Fine examples of this species were found in the Mt. Stephen collections. They show well the characteristic ornamentation, which resembles that of *Obolus* (*Botsfordia*) *pulcher* in that the cancellated ornamentation is developed chiefly on the middle zone of the shell, the front part being concentrically striated only. Still, there are dorsals which show the cancellation over nearly the whole surface. The shell has the convex pseudo-deltidium characteristic of Iphidea. No examples showing the interior of the valves were obtained.

There are specimens of this shell in both the Walker and the Canadian Geological Survey collections.

ACROTHELE SUBSIDUA, White.

Mr. Walker's collection contains several examples of the valves of this species, usually much flattened. One or two show well the concentric ridging and the more minute, somewhat wavy ridglets between. One dorsal is 9 x 10 mm. in size. Owing to the crushing, the internal features are obscure in these valves.

Some good examples of this species were found in the collection received from Mr. Walker.

OBOLUS ELLA, Hall & W.

Comparatively few examples of this species were found, and they do not show good interiors; still the discoid, circular form agrees better with Obolus than Lingulella; and the position of the central muscles, so fai as they can be made out, corresponds to Obolus. Perhaps the low broad cardinal area of the ventral valve accords more decidedly with Obolus than the other peculiarities of the valves, which are modified to suit the discoid form of the valves.

The largest valve observed was a dorsal, somewhat abraded, 9 x 10½ mm. across. The species is somewhat "satchel"-shaped.

Mr. Walcott in an MS. note remarks that this species varies greatly in different localities and sediments. He refers it to his new subgenus *Westonia* on account of its surface which is not shown in the few specimens in my hands.

ACROTRETA of BAILEYI.[1]

A thin-shelled form which has suffered much from compression, is not rare in the Mt. Stephen shale. As in *A. Baileyi* the area of the ventral valve is quite short, and the median ridge of the interior of the dorsal has the broad lance-formed end of that of Linnarssonia.

Sculpture. This consists of very fine concentric striæ, somewhat obscured by a minute granulation.

Size. Length, 3½ mm.; width, 4 mm.; height (as compressed in the shale) less than 1 mm.

This species is very Linnarssonia-like but the beak is too sharp and too much elevated for that genus; also the smooth shining shell of Linnarssonia is wanting.

LEPTOBOLUS cf. GRANDIS.[2]

A number of examples of a small brachiopod were found, which by its size and form comes near the above species.[1] It is a thinner and flatter shell but the difference may be due to the occurrence in shale in place of sandstone. There is less difference in the comparative length of the two valves than in *L. grandis*, and the sculpture also is different. *Sculpture* consists of faintly marked fine, concentric striæ, with more distinct undulations of growth, the whole obscured by a minute granulation.

It is distinct from Hall's species of the Utica slate in the absence of minute concentric striæ, distinct, close and regular, also in its larger size.

METOPTOMA AMII, n. sp. (Plate 1, fig. 12).

Examples of this shell are usually much flattened and the natural form obscured. The apex was usually somewhat excentric and was acuminate. Outside of the acuminate apex the slopes of the shell were convex, and so continued to the margin.

Sculpture. Only very faintly marked radiating striæ are visible and a few concentric undulations of growth.

Size. Length of orifice 10 mm.; width, 8½ mm.; height (as compressed in the shale), 2 mm.

This species was not quite so large as *Metoptoma Barrandei*, Linrs., and differed in its smooth surface. It was much flatter and was smaller than the Metoptomæ of the Potsdam sandstone of Wisconsin.

---

[1] Trans. Roy. Soc. Can., Vol. III., p. 36, pl. v., figs. 13, 13 *a b c*.

[2] Trans. Roy. Soc. Can., Vol. XI., p. 91, pl. 16, figs. 7*a* to *c*.

DESCRIPTION OF THE PLATE.

Fig. 1. *Obolus torrentis*. Dorsal valve, Mag. $\frac{3}{1}$. Coldbrook terrane.

Fig. 2. *Obolus triparilis*—*a*, Ventral valve—*b*, Dorsal valve, interior—*c*, Section of same. All mag. $\frac{4}{1}$. Lower Etcheminian.

Fig. 3. *Obolus discus*—*a*, Ventral valve—*b*, Dorsal valve—*c*, Interior of same. All mag. $\frac{4}{1}$ —*d*, Cardinal area of dorsal, further enlarged. Lower Etcheminian.

Fig. 4. *Obolus æquiputeis*—*a*, Ventral valve—*b*, Interior of same—*c*, Dorsal valve—*d*, Interior of same. All mag. $\frac{8}{1}$ —*e*, Surface markings, enlarged $\frac{10}{1}$ Lower Etcheminian.

Fig. 5. *Obolus Bretonensis*—*a*, Ventral valve—*b*, Interior of same—*c*, Section of same—*d*, Dorsal valve—*e*, Interior of same. All mag. $\frac{4}{1}$. Upper Etcheminian.

Fig. 6. *Obolus lens*—*a*, Ventral valve—*b*, Interior of same—*c*, Section of same. All mag. 2½ —*d*, Dorsal valve—*e*, Interior of same. Both mag. $\frac{3}{1}$ Upper Etcheminian.

Fig. 7. *Obolus pulcher*—*a*, Ventral valve, outline of interior—*b*, Dorsal valve, interior. Both mag. $\frac{4}{1}$. Protolenus Fauna.

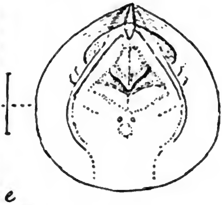
Fig. 8. *Obolus pristinus*—*a*, Ventral valve—*b*, Side of same—*c*, Mould of a ventral (?)—*d*, Back view of same. All mag. $\frac{3}{1}$ — *e*, Dorsal valve, young, mould of. Mag. $\frac{4}{1}$. Protolenus Fauna.

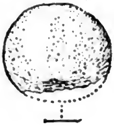
Fig. 9. *Obolus Ella*—*a*, Ventral, outline of interior—*b*, Dorsal valve, outline of interior. Both mag. $\frac{2}{1}$. Peltura Fauna.

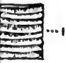
Fig. 10. *Obolus Apollonis*. Eichwald, var. *Quenstedti*. After Michwitz. Diagrams of the ventral and dorsal valves, enlarged; showing positions of the muscle scars and vascular trunks (the branches of the latter are omitted). Dictyonema Fauna, or below.

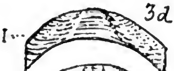
Fig. 11. *Obolus refulgens*—*a*, Ventral valve, interior—*b*, Dorsal valve, mould of interior. Both mag. $\frac{4}{1}$. Dictyonema Fauna.

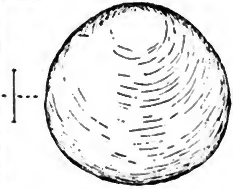
Fig. 12. *Metoptoma Amii*, n. sp.—*a*, Shell seen from above—*b*, Same from the side. Both mag. $\frac{2}{1}$. Peltura Fauna of Mt. Stephen, Field, B.C.

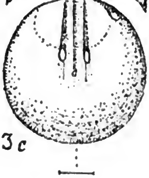

4 b

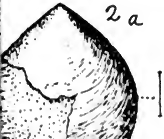

1

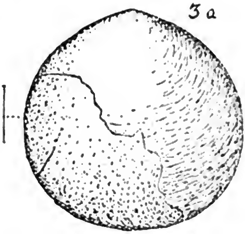

4 e

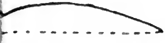

3 d

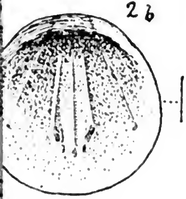

4 c

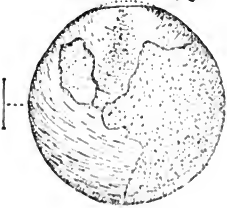

3 c


2 a


3 a


2 c


2 b


3 b

IV.—*Further Experiments in Plant Breeding at the Experimental Farms.*

By Wm. Saunders.

Director of Experimental Farms.

(Read May 27, 1902.)

Experiments and observations in connection with the cross-breeding of plants have been conducted from year to year at the Canadian Experimental Farms since their establishment in 1887-8.

In 1894 the writer presented a paper to the Royal Society of Canada on the progress of these experiments, in which some details were given of the results obtained from the crossing of varieties of wheat, barley, oats and pease, with the object of obtaining new sorts, more productive, earlier in ripening, and higher in quality. Reference was also made at that time to crosses obtained with different sorts of gooseberries and raspberries, and to some hybrids between the black currant and gooseberry.

In the present paper some particulars are given of further progress in these lines of work.

Cross-bred Wheats.

Experiments have been conducted with this important cereal since the spring of 1888, and several hundreds of new varieties have been produced, among which some very promising sorts have appeared. The Red Fife, universally recognized as a variety of the highest excellence, which produces most of the celebrated "No. 1 hard wheat" of Manitoba and the North-west Territories, has been used in many of these crosses with the object of producing a variety equal to the Red Fife in quality, productiveness and vigour, but which would ripen earlier and be more rust-resisting. With this in view, early ripening sorts have been brought from different parts of the world, especially from countries where the season is short. The Red Fife has been bred with these and the crosses obtained have in many instances been found to possess some of the desirable characteristics of both parents.

Among other early experiments the Red Fife was crossed with Ladoga, an early ripening Russian wheat, and from this source very promising varieties were produced. Among the more notable examples are the two wheats known as Preston and Stanley. The Red Fife is a beardless wheat, while the Ladoga is bearded. The Preston is a vigorous growing bearded sort, while the Stanley is a beardless sport from the Preston. The Preston wheat has manifested from the outset a remarkably vigorous and prolific character. During the past seven years it has been tested in uniform trial plots with nearly 100 other varieties of spring wheat at all the Dominion experimental farms, and, taking the average of all the results obtained, the Preston has given a heavier crop than any other sort.

As compared with the Red Fife the Preston has given an average crop for the whole time of 33 bushels 58 lbs. per acre, while the Red Fife, during the same period and under similar conditions, has yielded 32 bushels 30 lbs., a difference in favour of the Preston of 1 bushel 28 lbs. per acre. It has not yet been definitely proven that the quality of the Preston is equal to that of Red Fife; it is, however, regarded as an excellent wheat. Samples sent to the office of the High Commissioner for Canada in London, England, in 1900, were submitted to one of the best wheat experts on the London market for opinion. Regarding the Preston, he reports that after a careful examination he finds it to be of most excellent quality for milling purposes, rich in gluten, and the type of wheat the British miller wants.

In a field crop of five acres, grown on the experimental farm at Indian Head, in 1901, the Preston wheat averaged 54 bushels 54 lbs. per acre, while a field of 3½ acres of Red Fife, grown on similar land with the same treatment, gave 49 bushels 40 lbs. per acre. The Preston ripens about four days earlier than the Red Fife, which is a decided advantage in a short season. This earliness, associated with greater productiveness, is remarkable, for, as a rule, any considerable gain in earliness is associated with a diminution of crop; the berry being smaller and less plump as the ripening is hastened.

The variety of wheat known as Stanley, although a twin product with the Preston, has not shown quite as much vigour nor so high a degree of productiveness, it having given, during the seven years referred to, an average crop of 31 bushels 19 lbs. per acre, being 2 bushels 39 lbs. per acre less than Preston.

In testing the many new varieties of wheat produced, all those which show a lack of vigour and productiveness are discarded after trial for three or four years. From the new sorts which have been originated at the experimental farms during the past thirteen years, fifty-four have shown sufficient promise to justify their being included in the list of those annually tested in the comparative trial plots at the several experimental farms.

In conducting these experiments the object in view, as already stated, is to originate new varieties of wheat equal in quality to Red

Fife, earlier in ripening, more rust-resisting, and more productive. Red Fife is an excellent wheat which produces a flour unsurpassed in quality, hence it would be unwise to do anything which would tend to lessen the interest in that variety, until it is proven that we have other sorts equally good as to quality, associated with advantages in earliness and productiveness. It should, however, be borne in mind that in the growing of wheat there is constant self-fertilization, and this "in and in" breeding may sooner or later cause deterioration. The Red Fife has, fortunately, maintained its vigour and excellent quality in the Canadian North-west for many years and as yet does not show any signs of deterioration. Hence, in the meantime, effort is made by careful selection and cultivation to grow every year on the western experimental farms considerable quantities of this valuable sort of the purest and best quality. This is distributed for seed among some of the best farmers, so that the general purity and high quality of the Red Fife wheat may be maintained. Red Fife is not, as a rule, so successfully grown in the Eastern Provinces, and there, other varieties are needed, and the new sorts referred to are gradually finding their way into general cultivation in many of the eastern districts. Should there at any time be any material diminution in the productiveness and vigour of the Red Fife on the prairie lands of the west, we have, in these new sorts, other varieties which will be available to take its place.

In the efforts to obtain rust-resisting sorts crosses have been made chiefly with varieties of *Triticum durum*, of which the Goose and Roumanian wheats are well known examples. Some work has also been done in crossing the Speltz wheat with other spring varieties. Long experience has shown that these sorts are less liable to the attacks of rust than most other varieties, but the grain is inferior in quality for bread-making. In producing these crosses Red Fife has generally been used as one of the parents, with the hope of securing a higher quality in the progeny. The experience had with these later crosses has not yet been sufficient to permit of reliable opinions being formed as to their merits.

One of the most interesting crosses in wheat yet made here was produced in 1900 by Dr. C. E. Saunders, to whose careful and skillful manipulations I am indebted for many of the most promising sorts under trial. In this instance the Red Fife flowers were fertilized with pollen of the Polonian wheat, *Triticum polonicum*. The Polonian wheat has a very large and remarkable head, with very large kernels. As a rule the plant grown from the kernel resulting from the cross produces heads closely resembling those of the female used in the experiment, and such modifications as are brought about by introducing the blood of other sorts, are not very distinctly manifest until the second generation, when the plants vary to a degree which is remarkable. In this instance, however, the head was very much modified in the first generation, and the plant produced from the Red Fife kernel which was fertilized by the Polonian pollen gave heads which were quite unlike Red Fife, with kernels considerably larger than are ever found in that variety. The kernels were removed without destroying the head which still retains much of its natural form. These kernels have been sown and are producing vigorous plants, among which some remarkable variations may be expected.

Cross-bred Barleys.

In the cross-breeding of barley the two-rowed sorts *Hordeum distichon* have been crossed with the six-rowed *Hordeum hexastichon*. The six-rowed sorts ripen earlier than the two-rowed, while the latter stools much more freely. This cross has been effected with the object of bringing about earlier ripening in the new varieties of two-rowed originated and a greater tendency to stool in the new six-rowed sorts. A number of productive and useful varieties have been thus obtained. Among the new two-rowed barleys produced, the Beaver and Nepean stand in the front rank, and among the new six-rowed sorts, the Royal and Nugent. These have all gained a good record for productiveness and quality, and are now grown to a considerable extent. Six-rowed varieties of bearded barley have also been crossed with six-rowed beardless sorts and some promising results obtained.

In crossing the two-rowed barleys with the six-rowed, the plant produced from the hybridized kernel has usually resembled the variety used as the female in the cross, but when the crop from this plant has been sown the following season many striking and singular variations have occurred, some heads having two rows, others six rows, while some have intermediate forms. By selecting the most promising sorts and rejecting from among these all the variations which occur subsequently from year to year, the type will in a few years usually become fixed and will reproduce itself in a pure form.

Cross-bred Oats.

In the crossing of oats the improvements looked for were increased productiveness, earliness in ripening, stiffness of straw, plumpness of grain, thinness of hull, and less liability to rust. Black oats have been crossed with white, and, in some instances, three varieties have been obtained by subsequent variations from the one kernel, viz., black, white and dun coloured. Sided oats have also been crossed with branching, from which oats have been produced with half branching heads. Among the most productive of the cross-bred oats are the Cromwell, a cross between Prize cluster female and Giant cluster male, which last year stood at the head of the list of varieties tested at the Central Experimental Farm, the Kendal, which has given on the trial plots at all the experimental farms for the past three years an average crop of 70 bushels 18 lbs. per acre, and Holland, a cross between Giant cluster female, and Prize cluster male, which has given for the same period an average of 69 bushels 1 lb. per acre.

Cross-bred Pease.

Many useful crosses have been made in this group, some of which have produced heavy crops. The Arthur, a cross between the varieties known as Mummy and Multiplier, stands at the head of the list tested at the Central Experimental Farm, having given an average during six years trial of 37 bushels 35 lbs. per acre. Among the other varieties which have stood high in productiveness are Carleton, which was obtained from the same cross as Arthur, King a cross between the Mummy and the large White Marrowfat, and Paragon, a cross between the Black-eyed Marrowfat and Mummy. In all, about 175 cross-bred sorts of pease have been produced, and after discarding those which have proved deficient in vigour, productiveness or quality, there still remain thirty varieties which have shown sufficient merit to warrant their being placed with the best of their class.

Cross-bred Apples for the Northwest Plains.

Ever since the experimental farms were established continued efforts have been made in the Canadian North-west to obtain apple trees which would be hardy enough to endure the climate of that country. All the promising sorts obtainable in Northern Europe, the Northern United States and elsewhere have been secured and tested in considerable numbers, both with and without shelter, but thus far unsuccessfully. In the spring of 1887, among other seeds received from the Royal Botanic Gardens at St. Petersburg, Russia, there was a package of the seed of the "berried crab" from northern Siberia, *Pyrus baccata*. Young trees were raised from this seed and sent to the experimental farms at Brandon and Indian Head to be tested and have now been under trial there for the past ten years. They have been found perfectly hardy and have borne good crops of fruit. These trees are dwarf in habit, low-branched and strongly built, and the fruit is very firmly attached to the branches. They are hence well fitted to endure the strong winds which sometimes prevail on the open plains. The fruit, however, is very inferior in quality and very small, about the size of a cherry. (See fig. 1.)

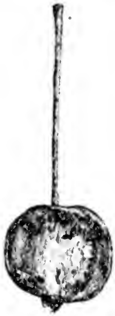


FIG. 1.
PYRUS BACCATA.

Having found in this species a tree with the degree of hardiness desired, experiments were undertaken with the object of increasing the size and improving the quality of the fruit by cross-fertilizing it with some of the hardiest and best varieties of apples grown in Ontario. The first experiments made in 1894 were with the Tetofsky, Duchess and Wealthy, and, as opportunity offered, other sorts have been used and thus this work has been gradually extended. Thus far the introduction of the blood of the larger apples has not appreciably lessened the hardiness of the trees, and all the varieties tested at the experimental farms, both at Brandon and Indian Head, have passed through the winters uninjured.

In the character of the foliage, colour of the wood and form of growth of the cross-bred trees, there is much variation, some resembling the varieties of cultivated apples used as the male, while others are more like the wild form of the female. More than fifty of these cross-bred sorts have fruited, and nine or ten of them are of such size and quality as to justify their propagation for more general distribution.

Among these the following are worthy of special mention:

Charles. Pyrus baccata female, with Tetofsky male, planted in orchard at one year from seed, April 28th, 1896. The tree has grown rapidly and wintered well. In the spring of 1899 it bloomed freely. The flowers were deep pink in bud, large when open, pinkish-white, petals wide. The fruit set well and ripened about September 3rd.

Size of fruit $1^{9}/_{16}$ inches across and $1^{6}/_{16}$ inches deep, distinctly ribbed, calyx persistent. Colour a uniform yellow and very attractive. Flesh yellow, solid, crisp, juicy, with a pleasant flavour, mildly acid and very slightly astringent. Skin rather thin, fruit bakes well.

Pioneer. Pyrus baccata, female, with Tetofsky, male. Planted in orchard as a yearling tree, April 28th, 1896. It has grown rapidly and it blossomed freely in the spring of 1899. The blossoms were pink in bud, large and pure white when open, petals wide. The fruit set well and was ripe September 21st.

Size of fruit 1⅜ inches across and 1¼ inches deep, slightly ribbed, calyx persistent. Colour yellow, with a pink cheek. Flesh white, fine-grained, firm, crisp, moderately juicy, subacid, with a pleasant flavour, astringency very slight.

Novelty. Pyrus baccata, female, with Wealthy, male. Planted in orchard as a yearling tree, April 28th, 1896. This tree is an upright and vigorous grower with good foliage. Fruited in 1899. Blossoms deep pink in bud, white when open. Flowers large, petals broad.

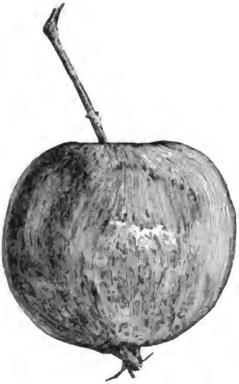


FIG. 2.—CHARLES.

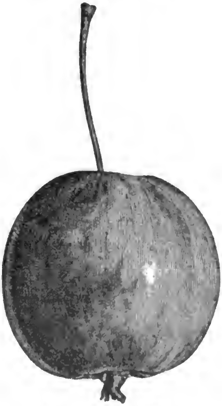


FIG. 3.—PIONEER.

Fruit ripe September 19th. Size 1½ inches across, 1¼ inches deep. Colour, deep red. Flesh, pale yellowish pink, firm, crisp, juicy, subacid and of fair quality. Stem long, calyx usually persistent, bakes well.

Progress. Pyrus baccata, female, with Wealthy, male. Tree a vigorous grower and fairly upright in habit. Planted in orchard as a yearling, April 28th, 1896. Blossomed freely in 1899, flowers deep pink in bud, pinkish-white when open, flowers large, petals wide.

Fruit ripe September 14th. Size $1^5/_{16}$ inches across and $1^3/_{16}$ inches deep. Colour yellow suffused with red, with a dark red cheek. Flesh very firm, crisp, juicy, subacid and of fair flavour, astringency barely perceptible. Stem long, calyx persistent.

Aurora. Pyrus baccata, female, with Tetofsky, male. Planted in orchard as a yearling, April 28th, 1896. Made strong growth and blossomed well in spring of 1899. Flowers deep pink in bud, large when open, pure white, petals broad.

Fruit ripe September 6th to 10th. Size $1^7/_{16}$ inches across and $1^3/_{16}$ inches deep, calyx persistent. Colour bright red almost all over. Flesh crisp, juicy, acid, and of fair flavour, astringency very slight, bakes well.

Among other varieties of promise are Cavan, Dean, Northern Queen, Carleton and Prairie Gem. Over 400 in all of these cross-bred fruits have been produced and many new sorts are fruiting each year. Most of the good varieties are being propagated for more extended distribution.

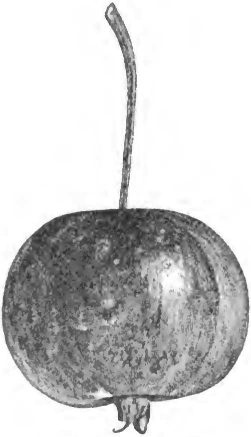


FIG. 4.—NOVELTY.

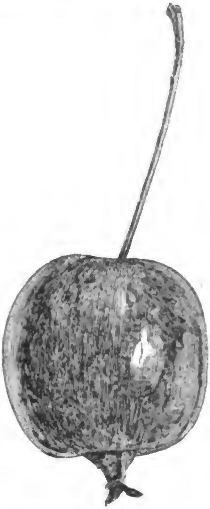


FIG. 5.—PROGRESS.

Cross-bred Gooseberries.

These have been made with the object of improving the size and quality of the varieties known as American gooseberries, by introducing strains of some of the best English sorts, so as to get as far as is possible the size and quality of the English gooseberry with the comparative freedom from mildew which characterizes the American sorts. Two of the gooseberry crosses, Pearl and Josselyn (Red Jacket), have become popular and are now in general cultivation in

Canada and the United States on account of their useful size, productiveness and freedom from mildew.

The crosses in gooseberries include a number of other promising sorts.

Many crosses have been made with red and black raspberries, *Rubus strigosus* with *Rubus occidentalis,* the progeny of which have been purple caps, many of them of large size. The black currant, *Ribes nigrum* has been crossed with the gooseberry *Ribes grossularia* and some interesting results obtained. Crosses have also been effected between the sand cherry and the plum *Prunus pumila* with *Prunus americana,* with *Prunus nigra* and *Prunus americana, Pyrus maulei* and *Pyrus japonica,* and between *Berberis Thunbergi* and *Berberis vulgaris purpurea.*

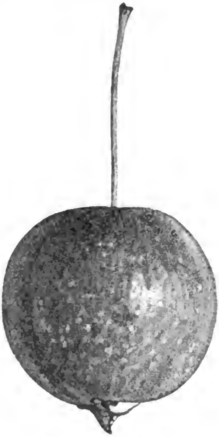


FIG. 6.—AURORA.

A large quantity of most interesting material has thus been accumulated, among which, no doubt, many new sorts of practical value will be found.

V.— *Some Features of the Flora of Northern New Brunswick.*

By G. U. HAY, D.Sc.

(Read May 27, 1902.)

The rivers of Northern New Brunswick present a most inviting field for the botanist as they do for the angler; and if the former has something of the sportsman in his nature—and what botanist has not—I know of no place more congenial for the woodsman and canoeist than the Restigouche, the Nepisiguit and the Tobique. The very names are suggestive of a woodsman's paradise. The weary dweller in far off cities sniffs the breath of the forest and the exciting chase of the antlered moose and caribou or the struggles with gamy salmon and trout; the forester with admiring eye can note the girth and height of lordly pines and spruces, or giant birches and maples, and at night be gently lulled to refreshing slumber by the sough of the wind through their tops as he stretches contentedly beneath their broad canopy; the canoeman, gliding over the swift pebbly stretches of the Restigouche, or through the rock strewn rapids of the Nepisiguit, or among the many devious windings of the Tobique and Serpentine, can say exultingly: "Were there ever woodland rivers like these!" The botanist, while he hails the discovery of rare plants in these little explored regions, will rejoice more in the luxuriance and the harmonizing influences of vegetation to be found in the deep gorges, in the river valleys, in the mazes of primeval forests, or in the Arctic forms that cling to the rocks of wind-swept mountain tops.

It has been my good fortune in recent years with a congenial companion to explore these rivers to their sources, to spend days lazily paddling with the current or alternately climbing up the foaming waves of rapids, or making weary portages around cataracts or through intervening forests; to sleep contentedly at night in mosquito proof tents;—these and many other experiences, delightful and otherwise, are the lot of those who explore the forests and inland waters of Canada.

Before drawing your attention to the flora of the Restigouche river, I may refer to some of the characteristic features of that valley which forms the northern boundary of New Brunswick. The high plateau country which extends from the St. John river to the Bay de Chaleur is underlaid with calcareous slates formed under the sea in past ages. Through these yielding slates the Restigouche has cut its way eastward, delving deeper into the earth as it approaches the sea. Next to the St. John and Miramichi, the Restigouche is the largest river in New Brunswick, draining an area within the province of some 2,200 square miles. The wide divergence of its four chief tributary streams, three from the north which drain a portion of the province of Quebec and one from the south, the Upsalquitch, explains the origin of its name — the river of the five fingers. This divergence of its branches, one of which is as large as the main stream, and all of them flowing nearly at right angles to the main stream, makes the drainage area of the Restigouche system not far from 5,000 square miles. The length of the main stream is 150 miles and during its course there is a descent of about 600 feet. Its flow is strong and swift, over a gravelly bottom, broken by rapids on an average of every hundred yards or so, but everywhere navigable for canoes. Its waters are clear and cold, from the springs of the dense wilderness to the north. As one descends the stream, the valley becomes extremely narrow, flanked by hills rising steep from the water's edge, but scarcely ever too steep to admit of a luxuriant vegetation, chiefly evergreen, which gives a somewhat sombre character to the lower course of the river, although in autumn enlivened by the scarlet and yellow of the numerous maples, birches and other deciduous trees. The prevailing evergreens are the white and red spruce and fir with a few white pines of small growth. In the loops formed by the winding course of the river there may be seen at frequent intervals, now a stretch of meadow land, now beautiful terraces from thirty to seventy feet above the river; but so suddenly does the stream change its course that these meadows and terraces alternate in quick succession from one side of the headstrong river to the other. These level spots are clothed with the most luxuriant vegetation whose vivid green in the growing season contrasts with the clear flashing waters below them and the darker evergreen of the hillsides beyond. The small area of the meadows and terraces with the precipitous hillsides and wild scenery around them, make them suited for garden spots of those fishing lodges so picturesquely perched above the salmon pools at various points on the river.

The rich alluvial soil, the many sequestered nooks and shady ravines of the Restigouche furnish most congenial habitats for ferns. There is probably no district in Eastern Canada, except Owen Sound, where they are found in greater luxuriance and variety. Nearly every species found in the province of New Brunswick is represented there. In the fertile meadows in the middle and upper course of the river the most abundant was the *Onoclea Struthiopteris,* or ostrich fern, growing in such luxuriance that fronds six feet in height were not rare. Equally luxuriant and growing beside it in many places was the shield fern, *Aspidium aculeatum* var. *Braunii*, and the different types of the royal fern (*Osmunda*) and the *Asplenium thelypteroides*. On the islands near the mouth of the Metapedia was found that most graceful of all our larger ferns, the maiden-hair, *Adiantum pedatum*.

The gorges and hillsides furnished an even greater variety of the smaller ferns. The rock Polypody (*Polypodium vulgare*) somewhat rare in our northern counties grew in great profusion in places, its fronds sometimes reaching a length of from fifteen to eighteen inches. The green spleenwort, *Asplenium viride*, filled crevices of limestone rock, occasionally found with the rarer cliff brake, *Pellæa gracilis*. The delicate and graceful fronds of these two ferns and their light green color, arching out from the gray crevices of rocks, often far beyond reach, and the two bladder ferns, *Cystopteris bulbifera* and. *C. fragilis* occupying the *taluses* at the foot of the cliffs, formed a picture that would delight the lover of these beautiful plants. Both the *Asplenium viride* and the *Pellæa gracilis* are ferns loving the shaded calcareous rocks having a northern exposure, and are extremely difficult to cultivate. I have succeeded with the *Asplenium* after repeated attempts, and then only by reproducing the conditions of its habitat as exactly as possible. The *Pellæa* has so far defied all attempts with me at cultivation. Other rare ferns met with in secluded places on the hills and mountains were the rare *Aspidium fragrans*, its clusters of dead and living fronds forming patches among inaccessible rocks, and *Woodsia hyperborea* and *W. glabella*. These three ferns, known in but few localities in the Atlantic provinces of Canada, were found in several places on the Restigouche, and were especially abundant near the top of Squaw Cap Mountain at a height of nearly two thousand feet above the sea. By making a rockery and lining the crevices with portions of slate rock gathered from where the ferns were growing, I have succeeded so far in making them thrive passably well.

One of the most abundant plants on the Upper St. John river and along the whole course of the Restigouche is the Campion Flower, *Silene cucubalus*. The branching habit of this plant, forming clusters in congenial situations, its greenish white leaves, gray bladder-like calyx, surmounted by a milk white corolla, renders it a conspicuous and interesting object along the shores and islands of these rivers. It is not indigenous, but has evidently followed the footsteps of man as explorer and settler. Mr. M. L. Fernald, of Cambridge, in an interesting article on this and some other foreign plants, attributes their introduction into New Brunswick and Maine to the Jesuits and early French explorers. In this connection it is interesting to note the presence of a plant near Fredericton, New Brunswick, which, so far as I know, is not found in any other locality in the Northern States or

Canada. This is *Pimpinella saxifraga,* a plant common in France and Central Europe. It belongs to the Umbelliferæ family and might be easily mistaken for the caraway. It covers both sides of the road for two or three miles above Fredericton to the exclusion of almost every other plant. It is, no doubt, an aggressive weed, but up to this time has shown no disposition to spread broadcast, as the caraway has done, over cultivated fields and meadows. This conservatism is highly praiseworthy in a weed. Its advent to the locality near Fredericton was very likely coeval with the French occupation more than two centuries ago. The history and habits of this plant are worthy of investigation.

I am not aware that the question has ever been raised whether the Hop, *Humulus Lupulus,* is indigenous in any province of Canada or not. It has been a question among plant students in New Brunswick, but its discovery along the Restigouche in positions where it could not be very well introduced, perhaps settles the matter in favour of its being a native.

The presence of a vetch with yellow flowers, *Lathyrus pratensis,* on an old camping ground near Boston Brook on the Restigouche, as also its presence on the Miramichi, and in a meadow near Salmon river below Grand Falls on the St. John, shows that it may have been introduced.

The most abundant deciduous tree on the middle and upper waters of the Restigouche is the Balsam Poplar, *Populus balsamifera,* and on some of the low grounds it had taken complete possession, the upper portion of the soil being a matwork of its roots.

Many plants found on the upper waters of the St. John are equally abundant along the Restigouche, growing on the Silurian ledges, the outcroppings of which are very frequent on the borders of the stream. Those most frequently noticed were: *Anemone Pennsylvanica, A. riparia, A. multifida, Castilleia pallida,* var. *septentrionalis, Hedysarum boreale, Parnassia Caroliniana, Tofieldia glutinosa, Astragalus alpinus, A. oroboides, Shepherdia Canadensis, Apios tuberosa, Allium Schœnoprasum, Desmodium Canadense, Prunus pumila, Oxytropus campestris, Asclepias cornuti, Sanguinaria Canadensis, Caulophyllum thalictroides, Asarum Canadense,* and a few others. *Tanacetum Huronense,* very abundant on the St. John river, was found in but one locality on the Restigouche. This is the farthest point east, to my knowledge, that this interesting western plant has been discovered. Another interesting western plant found at Eel river, below the mouth of the Restigouche, is *Collomia linearis.* The only stations reported east of Minnesota are in the State of New York, at the station above mentioned, and near Point Lepreau, New Brunswick, where it is apparently introduced. It is one of the curiosities of plant distribution that this peculiar western plant should be found at a point so far east as the Eel river station, with apparently no intervening points of distribution.

Pinguicula vulgaris, a curious insectivorous plant, very widely distributed in the northern parts of Asia, Europe and North America, is found along the Restigouche occupying, at intervals, a length of territory not exceeding twenty miles. It grows on wet, mossy rocks with *Primula mistassinica* and *Pellæa gracilis.* Transferred to a rockery built on the edge of a brook, it has flourished well for several years, but seems to do equally well in a grass plot beside a path, where some plants were accidentally dropped and took root. Its rosette of yellowish-green leaves, sending up in June flowers on scapes similar to the blue violet (whence its common name of bog or marsh violet), makes it a very attractive plant in cultivation, while its upturned leaves, with the active juices, are ever ready to diminish the horde of mosquitoes, black flies or other insects that may alight upon them.

One of the most remarkable inroads of a weed that I have ever noticed was that of the *Hieracium prœaltum,* appropriately named the "king-devil." From the mouth of the Upsalquitch down to the estuary of the Restigouche it has taken possession of roadsides and farms, invading even the woodland districts, threatening the extirpation of the smaller native plants. I have never seen a farmer more helpless in the presence of a weed than one who lives near the mouth of the Upsalquitch. His fields were being steadily covered with the "king-devil," so that one could walk over them on the carpet of basal leaves thrown up by this ill-favoured plant. It was the old story of neglect on the one hand and weed-aggressiveness on the other.

The presence of many Alpine plants in the valley of the Restigouche is of interest, especially near the mouths of the tributaries that flow into it from the highlands of South-eastern Quebec. Among these are the small Timothy, *Phleum Alpinum, Arctostaphylos, Uva-Ursi, Solidago virgaurea* var *alpina, Arnica mollis, Pyrola secunda* var *pumila, Galium boreale, Goodyera Menziesii, Anemone parviflora, Carex atrata* var *ovina, C. alpina,* with other flowering plants and ferns already mentioned, including especially the ferns *Asplenium viride, Woodsia glabella* and *W. hyperborea, Aspidium fragrans* and *A. aculeatum, Pellæa gracilis.*

THE NEPISIGUIT.

The physical features and flora of the Nepisiguit river differ in many respects from those of the Restigouche, although the streams run parallel and at no great distance apart. The bed of the Nepisiguit is an interminable succession of rocks and shingle, while that of the Restigouche is everywhere overlaid with gravel. There are few terraces on the Nepisiguit, while these are picturesque features of the Restigouche, especially where they are crowned with fishing lodges, the summer abodes of anglers. The flora of the Nepisiguit is less interesting and varied than that of the Restigouche, affording fewer rare plants, especially ferns and those boreal species brought down from the hills and mountains of Quebec. The Restigouche has comparatively low land along its upper course, the country rising into hills and mountains along its lower stretches. In the portions of the Nepisiguit towards the mouth, especially above Grand Falls, the hills are low, but the land gradually rises as the river is ascended until altitudes of from 1,000 to 2,500 feet are met with along its upper waters and at its source. The Nepisiguit has only one tributary of any importance, the South West Branch, which is nearly equal in size and volume to the main stream. Many islands occur in the Nepisiguit river, a few clothed with grass, but many more covered with a growth of trees, some of considerable size. Elms and butternuts covered the islands and adjacent meadows along portions of the upper river, and the arboreal vegetation is more varied than on the Restigouche. There were ample groves along the river of the scrub pine, *Pinus Banksiana*, some of these with large, straight trunks rising to the height of forty and fifty feet. Large groves of red pine, *Pinus resinosa*, were seen on the ridges around the headwaters of the Nepisiguit, their summits reaching to the height of eighty and even ninety feet. Unfortunately, large stretches along this river have been devastated by fire, which gives a bleak and desolate character to much of the country.

One of the rarest plants met with was *Aster linariifolius* at Pabineau Falls, its only known station in the province. On the summit of Mount Denys, from whose bald top, nearly 2,000 feet high, an extended view is obtained of north-eastern New Brunswick, including the whole valley of the Nepisiguit from the lakes at its source to the sea, there were a few boreal types of plants, including *Vaccinium uliginosum, V. Vitis-Idæa, Empetrum nigrum* and others. All along the river, *Euphrasia officinalis* was seen with other familiar weeds in the track of the lumberman, but not a vestige could be found of the plant referred to before, so abundant on the Restigouche, *Silene cucubalus,* although this river, as well as the Restigouche, was a pathway of the French explorers and missionaries, by whom, it has been supposed, the plant was introduced into the province.

The scenery along the upper course of the Nepisiguit is grand and picturesque. Lofty mountains, whose rounded and dome-shaped tops form fine positions for extended and uninterrupted views, were constantly in sight. Low islands became more numerous, and bending over the banks of the stream was a luxuriant vegetation of viburnums (*V. opulus, V. pauciflorum* and *V. cassinoides,* cornuses, thickets of nemopanthes), while everywhere was the bright, rich green of clumps of the *Osmunda regalis,* here attaining the height of a shrub. The tall grasses and ostrich ferns gave evidence of the richness of the soil, while the white blossoms of *Clematis* and *Viburnum Opulus,* the purple of asters and joe pye-weed, the yellow of golden-rod afforded everywhere striking contrasts to the vivid green of the foliage. Our average speed up this rough and wayward but beautiful stream was only about six or seven miles a day, but the invigorating exercise of climbing up rapids makes a pleasure of toil.

There are four lakes which form the source of the Nepisiguit river. Of these, three are scarcely more than ponds of little depth and with soft, muddy bottoms and low shores — the favourite feeding ground of moose, caribou and deer. The fourth lake is a fine sheet of water, very irregular in shape, especially on its northern side, where a long ridge (moraine) extends into the lake, covered with a fine forest of red pine. A portage of about two and a half miles following a decline of over two hundred feet, brings one to the system of lakes which give rise to the little Tobique river running westward to the St. John. Five plants, new to New Brunswick, were found in the Nepisiguit Lakes, *Ranunculus circinatus, Myriophyllum alterniflorum, Carex utriculata* var *minor, Potamogeton heterophyllus,* and *Pyrola secunda* var *pumila.* The latter was found on a hot August day at the headwaters of the Tobique, on the borders of Spring Lake, the temperature of which registered 41° F., a congenial habitat for a boreal plant.

The scenery of this portion of the province is strikingly wild and picturesque, and little visited by the sportsman, lumberman or naturalist on account of the difficulties of access. It contains the highest land in New Brunswick, some of the mountain peaks rising to the height of over 2,500 feet. The New Brunswick legislature, at its late session, laid aside a portion of country, including the Tobique and Nepisiguit lakes and the picturesque region about them as a provincial wild park, similar to the reservations in Ontario and many of the United States, for the preservation of its hitherto untouched forests, its game and water supply, and to serve as a place of resort and instruction for coming generations. The idea was first broached by Prof. W. F. Ganong,[1] and, with the aid of a committee of the Natural History Society of New Brunswick was brought to the attention of the government with the result mentioned above. In connection with this wild and picturesque region I may here mention that Prof. Ganong, with great industry and ingenuity, has devised a system of names for some of its prominent physical features, chiefly its mountains, which hitherto lacked any distinctive appellation, or were designated by meaningless repetitions of names given elsewhere in the province. The plan which Prof. Ganong has followed[2] aims to commemorate the names of some of the early discoverers and explorers of the province, its governors, and its scientific men. Group names are given to ranges or to those mountains which naturally form a group, such as the "Geologists' Range," the "Governors' Plateau," etc.

THE TOBIQUE.

The Tobique, emptying into the St. John river at Andover, is a larger stream and its drainage area much greater than that of the Nepisiguit. At its head a curious forking takes place: the Sisson Branch and South West Branch coming in nearly at right angles to the main stream, while the Little Tobique and Mamozekel are more nearly in line with it. These tributary streams, branching so widely, form a network of communication by means of short portages, with the Restigouche, Nepisiguit and Miramichi. No such system of rivers anywhere afford more favourable conditions for exploration for the naturalist and sportsman; and the well-beaten portage paths at the headwaters of the streams show that from times immemorial they have been used by warriors, hunters and explorers in their expeditions across the province from the St. John river to the Bay de Chaleur and Gulf of St. Lawrence. One of the most common routes, described by Governor Gordon in his "Wilderness Journeys" of New Brunswick, is the route up the Tobique, thence by the Little Tobique to the Nepisiguit and down that river to the Bay de Chaleur.

---

[1] See Bulletin of Natural History Society of New Brunswick, Vol. IV., Part 3, p. 247.

[2] "Proposals for a Nomenclature of New Brunswick Hills and Mountains." Bulletin Nat. Hist Soc. of N.B., Vol. IV., Part 3, p. 248.

The first one of our modern scientific explorers to make this journey was Professor L. W. Bailey, in 1863, and his description[1] contains the first contribution to the geology and botany of this region that we possess. The fine scenery along the Tobique river, the ease with which it can be navigated in canoes, and the wildness of the Nepisiguit valley, will always make this a favourite route of the admirers of river and woodland scenery, at least, while our forests are preserved, which it is hoped may be for a long time to come. The movement to set aside a wild park in this picturesque region, with a view to preserve and study our forest conditions and the hoarding up of the water supply of the rivers is an example that deserves imitation and the support of governments and scientific men everywhere in Canada. The botany of the main Tobique is not so rich in rare species and boreal types as the Restigouche, and to a lesser degree of the Nepisiguit. It has broad expanses of fertile meadows well suited for agriculture and some of the best farming land in the province is to be found along its valley.

Of its tributary streams, the Sisson branch is the most picturesque, especially the "Gorge," six miles from its mouth, which is one of the wildest and most picturesque spots in New Brunswick. A succession of cataracts and rapids, from a height of one hundred feet, flow through a gorge walled by perpendicular rocks. Here were found *Asplenium viride*, *Arnica mollis*, *Woodsia Ilvensis* and *W. hyperborea*, *Aster graminifolius*, and on rocks further down the stream, *Aspidium fragrans* and *Woodsia glabella*.

The southwest branch of the Tobique, whose sources are contiguous to the northwest branches of the Miramichi, drains a lake country which is one of the most remote and least visited regions of the province.[2] Its forests abound in big game—moose, caribou, deer — and numerous small fur-bearing animals. It is one of the few districts in the province where beavers are still to be found, exercising their industrious and ingenious habits of constructing their dams and dwellings. The country is dotted with lakes and ponds, and traversed with streams in every direction. It is a virgin forest untouched as yet by forest fires, and into the remotest districts of which the lumberman has not yet penetrated. Some of its lakes are deep, with rocky wooded sides, while others are shallow and bordered by marshes, covered by tamaracks, stunted swamp spruces, alders, viburnums and various heath plants such as Ledum, Kalmias, Vacciniums, Cassandra, Rhodora. The dark purple flowers of the pitcher plant contrasted with the clusters of white flowers of the Labrador Tea, in endless profusion, make even the swamps flower gardens. Everywhere the borders of the shallow lakes were covered with yellow and white pond-lilies (*Nuphar advena, N. Kalmiana* and *Nymphæa odorata*), the shield-like leaves of *Brasenia peltata*, numerous Potamogetons and the floating heart (*Limnanthemum lacunosum*), grasses, carices and other sedges, rushes and equisetums fill the shallower parts of the lakes. Among these, several rare forms were found, most of which are new to New Brunswick,—*Glyceria borealis, Scirpus atrocinctus* var *brachypodus, Carex canescens* var *vulgaris, Carex trisperma, Carex sterilis* var *excelsior, Carex interior, Carex stricta* var *curtissima, Carex rostrata* var *ambigens, Carex vesicaria* var *jejuna*. The arctic species of plants found on the Restigouche and upper St. John are absent along the Southwest Branch and other tributaries of the Tobique, which occupy a central position in Northern New Brunswick, lying in a comparatively sheltered position with numerous small affluents which take their rise in surrounding low hills. It is without any of the representatives of that New England flora which is found in the valley of the upper St. John in northern Maine and in northwestern and western New Brunswick, many of the species of which represent a flora to be found several degrees further south, but which the climate and soil along the St. John river cause to grow in abundance even side by side with boreal species. Among these are *Polygala Senega, Polygonatum biflorum, Asarum Canadense, Sanguinaria Canadensis, Tanacetum Huronense*, and others.

---

[1] "Notes on the Geology and Botany of New Brunswick," Prof. L. W. Bailey, *Canadian Naturalist*, 1864.

[2] "Notes on the Physiography of the Basin of the Negoot or South Tobique Lakes, W. F. Ganong, Natural History Society of N.B., Bulletin, Vol. IV., Part IV. from page 324; also "The Flora of the South Tobique Lakes," G. U. Hay, Nat. Hist. Soc. Bulletin of N.B., Vol. IV., Part V., from page 472.

It would be interesting in this connection to trace out this somewhat unique feature of the flora of the St. John river, combining as it does certain southern forms with boreal types, but I refer those who are interested to papers written by Dr. G. L. Goodale, of Harvard University, Mr. B. L. Fernald, of Cambridge, and other New England botanists, and to articles found in the Bulletins of the Natural History of New Brunswick.[1]

---

[1] "On the Occurrence of Arctic and Western Plants in Continental Acadia," by G. F. Matthew, Natural History Society of N.B., 1869. "The Botany of the Upper St. John," by G. U. Hay, Bulletin Natural History Society of N.B., Vol. I., Part 2, p. 21, 1883.

VI.—*The Classification of the Archæan.*

By PROFESSOR A. P. COLEMAN, M.A., PH.D.

(Read May 27, 1902.)

The literature on the Archæan of America is so immense and so scattered that a mere reference to the more important papers would demand a large amount of space. Fortunately, the older writings on the subject have been admirably discussed and summarized by Professor Van Hise, in his correlation paper on the Archæan and Algonkian,[1] an indispensable work for the student of these ancient and complicated formations, so that in general no reference need be made to them here. The views held by the various writers are so different and conflicting that no good purpose would be served in reviving the old controversies. Of late, however, there are signs that the two opposing schools on the north and on the south sides of the Great Lakes, as they come together in their field work in Minnesota, are also to some extent coming together in their opinions, giving hope of a final satisfactory solution of the difficulties.

It will be remembered that the earliest work on these formations was done north of the lakes by Logan and his assistant, Murray, while the workers on the American side, starting from a different standpoint, reached conclusions which did not harmonize with those formed by Logan and his successors. As a starting point one naturally takes the views of Sir William Logan as summed up in the Geology of Canada in 1863, dividing the Archæan, or Azoic as it was then called, into a lower system, the Laurentian, and an upper, the Huronian.

Following the ideas of the time, the gneisses which form the greater part of the rocks of the Laurentian were looked on as metamorphosed sediments. Above them came the Grenville series, characterized especially by crystalline limestones, the Hastings series, and the Anorthosites, all largely schistose and, therefore, considered metamorphic rocks.

The Huronian was not found in contact with the Grenville or Hastings series, but was considered later than any of the Laurentian rocks, largely because it is in part more evidently sedimentary and usually less crystalline.

It will not be necessary to discuss in detail the changes of view which have been caused by later studies of the Laurentian and Huronion regions; but we may hold with Dr. Adams that the Lower Laurentian or Ottawa gneiss is mainly, if not altogether, of eruptive origin, and, therefore, not a metamorphosed sediment; that the Anorthosites are later eruptives; and that the Grenville is probably a true sedimentary series which has sagged down synclinally into the Ottawa gneiss on which it rests.

---

[1] Bull. U.S. Geol. Sur., No. 86, 1892.

The Hastings series is considered only a less crystalline phase of the Grenville series by Dr. Ells, and also apparently by Drs. Adams and Barlow;[1] so that the Laurentian may be defined now as consisting of a lower eruptive group of mainly schistose rocks, the Ottawa gneiss; while the upper or Grenville and Hastings series are more or less metamorphosed sediments resting on the Ottawa gneiss and often nipped into it as synclines.[2]

THE HURONIAN.

The Huronian, as defined by Logan in 1863, was essentially a sedimentary series resting unconformably on the Laurentian. He describes first the rocks of Lake Temiscaming, then those of Doré river on Lake Superior, next those north of Lake Huron between Blind river and Lake Superior, giving an elaborate map founded on Murray's detailed work in the region, and finally the rocks of Thunder bay. It has been customary to speak of the region north of Lake Huron as typical, since the name Huronian was derived from that area; but Logan gives no suggestion that he did not consider the rocks of Lake Superior or of Lake Temiscaming equally typical, though he has treated them in less detail.

Resting unconformably on both the Laurentian and Huronian of the Thunder bay region is a series of black cherts and slates which he recognizes as distinctly later in age, the Animikie rocks of the present day.

After Logan's time Canadian geologists placed all the green schists and associated sedimentary rocks in the Huronian, until Dr. Lawson changed the nomenclature for the rocks of the Lake of the Woods (in 1885), and Rainy lake (in 1888), using the terms Keewatin and Coutchiching for upper and lower divisions of the schistose rocks resting on the Laurentian or nipped in as synclines between areas of gneiss. His reason for doing this was the apparent difference between the schists of western Ontario, which were largely of eruptive origin, and the quartzites and graywacke conglomerates north of Lake Huron, which were mainly sedimentary. Looking on the latter as typical he doubted whether the western rocks were really Huronian, and inclined to make them older than the typical Huronian.

---

[1] Origin and Relations of the Grenville and Hastings Series, Am. Jour. Sc., Vol. III., Mar., 1897, pp. 173-180.

[2] Geol. Sur. Can., Vol. XI., 108 and 109A.

The most important discovery of Lawson was that the Laurentian was not the oldest rock of the region, since it has an eruptive contact with the Coutchiching and Keewatin, which must, therefore, have been solid rock before the gneiss of the Laurentian had cooled and solidified. This discovery had far-reaching consequences, for if any part of the Keewatin was of Huronian age the generally accepted relationship of Huronian and Laurentian must be reversed.

SUBDIVISIONS OF THE HURONIAN.

Within the past few years evidence has accumulated showing that the Huronian as described and mapped by Logan and his successors in Ontario at least, must be subdivided into two formations, an upper and a lower, separated by a very extensive unconformity. The lower division corresponds in the main with Lawson's Keewatin and Coutchiching; while the upper one includes most of the Huronian as found on the north shore of Lake Huron.

The need for this division has been brought out by the tracing of the iron range rocks and of basal conglomerates containing pebbles of these rocks from the province of Quebec near Lake Temiscaming almost to the boundary of Manitoba on the Lake of the Woods, a distance of nearly 800 miles. As shown by the work of the Bureau of Mines of Ontario, every large area of rocks mapped as Huronian between these limits contains long belts or ridges of jasper, chert or granular silica interbanded with iron ore, and not far off thick bands of schist conglomerate or graywacke conglomerate containing pebbles of the banded silica.[1]

The interval between the upper and lower formations was long enough to provide for very extensive erosion of hard crystalline rocks over an area of at least 800 by 100 miles, and the building up of hundreds and often thousands of feet of conglomerate, containing well rounded pebbles and boulders of very heterogeneous rocks, such as granite, quartz porphyry, various greenstones and schists, and the characteristic rocks of the iron range. There are few unconformities in Palæozoic or later times which can be compared with it for magnitude, though Lawson's Eparchæan interval, the break between the Huronian and the Cambrian, is no doubt much greater.

The thick slate conglomerates of the Huronian north of Lake Huron with their numerous pebbles of jasper and chert evidently represent the basal conglomerate of the upper Huronian as found in other localities; and it is doubtful if the lower division occurs in the portion studied by Murray, though silica banded with iron ore belonging to the iron range has been found nine miles northeast of the Sault Ste. Marie and near Batchewana bay.[1] The slight break between the upper and lower divisions of the Huronian, as mapped by Murray, is not of much significance, the two conglomerates which he separates being closely alike in every respect; and almost the whole of the so-called typical Huronian may be classed as consisting of the basal conglomerate of the upper Huronian or the quartzites and arkoses rising above it.

---

[1] Ont. Bur. Mines, 1901, Vol. 10, pp. 200-204.

In the other regions described by Logan as Huronian, however, there are well defined members of both the upper and lower divisions. In the Temiscaming country we have jasper-bearing conglomerates of the upper division and banded jaspers of the lower; and the same is true of the Michipicoton area; so that the conclusion is unavoidable that in his Huronian, Logan included rocks both above and below the important unconformity described on a former page. As much of the lower division consists of schistose volcanic materials and sheared eruptives, while the upper conglomerate in many cases contains great quantities of materials derived as pebbles and boulders from the lower rocks, the whole rolled out and rendered finely schistose by squeezing and shearing, so that the pebbles may be entirely indistinguishable, it is not surprising that the two should have been confounded in reconnaissance work. In fact, hand specimens of schists from the two divisions at Michipicoton could not be separated even by men who had been at field work in that region, so closely alike are they.

When we add to this that the two divisions have undergone the same folding, squeezing and recrystallization, so that they are now everywhere in parallel position as to strike and dip, the reason will be clear why rocks really separated by a great lapse of time should have been thrown together as Huronian.

That the so-called typical Huronian, as mapped by Murray, is far from being typical is well known to all Canadian geologists who have worked in the region. If the different areas described as Huronian by Logan are examined it will be found that all the others contain a larger amount of eruptive material, have a more schistose and crystalline character, and have undergone a far greater amount of tilting and folding than the region mapped by Murray. In fact, the region specially mapped is quite exceptional in its gentle dips and slight metamorphism. The very same rocks may be followed a few miles east and west to localities when they have been nipped in as close folds and stand nearly vertical.

---

[1] Bur. Mines, 1901, pp. 189 and 201.

The American geologists who have attempted to correlate the Pre-Cambrian west and south of the Great Lakes with the Huronian to the north have usually contented themselves with a visit to the easily-reached shore between Thessalon and the Sault, and have carried away a quite false impression of the typical Huronian. In reality, the other sections described by Logan are far more typical than the one mapped, when compared with the great areas of Pre-Cambrian worked out since his time.

It is probable that the fundamental error of Irving in confounding the Animikie with the Huronian was due to his belief that the characteristic rocks of the latter lay nearly flat and were comparatively little changed sediments. If he had gone to Blind river, ten miles east of the region he visited, he would have found the same rocks much more metamorphosed and in a vertical attitude.

To some extent Lawson, who had not visited the region, however, was misled also in his questionings as to the relative position of his Keewatin and the Huronian. His schist conglomerates with their iron range pebbles, as on Shoal lake, are undoubtedly the equivalents of the slate conglomerates of the Huronian, the basal member of the upper division, and there are examples of banded silica and iron ore associated with his Coutchiching which, no doubt, represent the iron range rocks forming the upper part of the lower division at Michipicoton, one of the regions which Logan put in the Huronian. However, the vast series of ash rocks, agglomerates and sheared eruptives of the Rainy lake and Lake of the Woods regions have few parallels in other Pre-Cambrian regions of Ontario, and the gray fine-grained mica schists and gneisses of the Coutchiching scarcely occur east of Lake Superior in regions mapped as Huronian; so that the introduction of new names was thoroughly justifiable.

RELATION OF THE LAURENTIAN TO THE HURONIAN.

There remains one more subject to discuss before a classification of the Pre-Cambrian of northern and western Ontario can be taken up, the relationship of the Laurentian to the Upper Huronian or Huronian proper. It has been proved by Lawson that the Ontarian, as he names the Coutchiching and lower Keewatin, has been penetrated eruptively by the gneisses of the Laurentian which rose dome-like beneath them, nipping them into synclines, carrying off fragments of them and sending dikes into the steeply tilted schists. The eruptive character of the contact has been accepted by almost all geologists who have studied the region since Lawson's luminous reports on it, and may be looked on as satisfactorily proved. Were the upper Huronian sediments also laid down before the upheavals of the Laurentian and the folding of the Keewatin?

This question has been differently answered by different geologists. Logan and Murray assumed that the Huronian rested unconformably on the Laurentian, but described no section where this is proved. Irving and Van Hise concluded that they had found such a section on some small islands east of Thessalon, but Barlow, after studying the same section, believed the contact eruptive. Willmott and myself have twice visited the locality with a view to settling the matter, but do not feel absolutely sure of the relationship, though inclining to the belief that the contact is eruptive.

In our last visit, at a time of low water, in the spring of 1900, we noted on one of the islands a conglomerate crowded with boulders overlying a laminated quartzite with a few boulders of granite or gneiss looking like the Laurentian in its lower part; which apparently rested on the Laurentian. On a point of the mainland not far off is an auto-breccia of granite and gneiss somewhat suggesting a basal conglomerate. On an islet to the south of this, however, where conglomerate and granite come together, the latter appears to have fused and inclosed parts of the conglomerate in an eruptive way. The evidence seems too uncertain to decide the matter positively.

The only other example that has been described of a basal upper Huronian conglomerate resting apparently in place on the Laurentian, is from Baie des Pères, on the Quebec side of Lake Temiscaming, where Barlow and Ferrier found a mass of granite passing through a weathered brecciated zone up into a conglomerate forming the base of a series of greenish Huronian quartzites.[1] This conglomerate is evidently upper Huronian, since it contains, like the Thessalon conglomerates, some pebbles of jasper, evidently derived from the iron range, the top of the lower Huronian; and, as far as I am aware, it is the only example known of an undoubted Huronian conglomerate formed of underlying Laurentian materials.

On the other hand, there are in various places examples of upper Huronian conglomerates having Laurentian rocks in eruptive contact with them, as Willmott and myself have shown at Michipicoton.[2] Sir William Logan believed that the Huronian schist conglomerate and the Laurentian at Doré river in this region were more or less blended.[3]

---

[1] On the Relations and Structures of certain Granites and Associated Arkoses, Rep. B.A.A.S., Toronto, 1897, pp. 656-660; also Barlow in Geol. Sur. Can., 1897, 195 I.

[2] Bur. Mines, 1902, The Michipicoton Iron Region, 152-185.

[3] Geol. Can., p. 54.

but this appearance is due to sheared dikes of porphyry or felsite sent off from the Laurentian gneiss, which has an eruptive contact some distance north.

In many localities then the Laurentian is in eruptive contact with the upper Huronian and, therefore, later in age, while in one or two places the evidence seems to make it earlier. Can the two relationships be harmonized?

If we suppose the solid basis on which the Huronian was laid down to have had the composition of the gneiss of the Laurentian, and suppose further that this basement was fused, or at least, rendered plastic, by the ascent of the isogeotherms due to blanketing with a thick layer of overlying sediments, we may, perhaps, conclude that in cases where the conglomerate passes down into unchanged Laurentian breccia, the mass of sediments happened to be too small to raise the underlying rock to the temperature of igneo-aqueous softening or fusion. In such localities we should naturally expect the upper Huronian to be much less metamorphosed than elsewhere, and this really appears to be the case.

There is, of course, another possibility, viz., that the quartzite at Baie des Pères is later in age than the upper Huronian, Animikie, for instance, and not really Archæan. It is, however, very much like the quartzites of other regions held to be undoubtedly Huronian, and has little resemblance to the Animikie of Thunder bay.

Lawson in his latest treatment of the subject places the Huronian (Upper Keewatin) above the Laurentian with an unconformity between.[1] I have no doubt, however, that in most cases the reverse is correct.

THE RELATION OF THE HASTINGS AND GRENVILLE SERIES TO THE HURONIAN.

The next problem is the relationship of the Hastings and Grenville series to the Huronian. We may consider the two together since the Grenville is now held to be only a more crystalline phase of the Hastings series. The Hastings series with its schist conglomerates and limestone bands is suggestively like the upper Huronian of the west; and the quartzite of the Grenville suggests the upper Huronian quartzite. On the other hand, the gneisses of the Grenville, which Adams has shown have the composition of slates, come nearest in character to Lawson's Coutchiching gneiss, supposing it to be somewhat more completely metamorphosed than it is in the west.

---

[1] Univ. Cal., Bull. Dep. Geol., Vol. 3, No. 3, p. 61.

Unfortunately, the two clues which solved the relationships of the Huronian areas, the banded silica of the iron range in the lower Huronian or Keewatin, and the basal conglomerates containing iron range pebbles in the upper Huronian, cannot be applied to the southeastern Archæan, since nothing corresponding to the banded iron range jaspers has been found in them. Iron ores are common among them, but never interleaved with silica.

The Grenville must be earlier than the Laurentian, since the latter has been plastic enough to nip in bands of Grenville limestone before it solidified; but I have seen no conclusive evidence as to the relationship of the Hastings series to the Laurentian.

The age relationship of the Grenville rocks and the Laurentian gneiss is not always stated as given above. Drs. Adams and Barlow, for instance, say " the relations of the Grenville series to the Fundamental Gneiss are such as to suggest that in the former we have a sedimentary series later in date than the Fundamental Gneiss, which has sunk down into and been invaded by intrusions of the latter series when this was in a semi-molten or plastic condition." However, a little later they say that " masses of the highly crystalline limestone or marble in some cases lie quite isolated in what are, to all appearances, the lower gneisses, as if they had been separated from the parent mass, and had passed outward or downward into the gneissic magma." " The contact of the Fundamental Gneiss and the Grenville series would appear, therefore, to be a contact of intrusion, in very many cases at least." [1]

Still later they suggest that the Grenville series bears the same relation to the Fundamental Gneiss as the Huronian does further west, the similarity, however, not implying identity in age. From the quotations given it will be seen that their view is not really different from that advocated by Lawson and in this paper for the lower Huronian or Keewatin. In my opinion, however, the date of an eruptive rock should be determined by the time of its final consolidation, which would, of course, place the Laurentian gneiss as described by Adams and Barlow later than the Grenville limestone which it has invaded. This does not imply that the Grenville series, or the Coutchiching and Keewatin of the west, the oldest known rocks, were founded on nothing; but that their foundations have since been become semi-molten, or at least plastic, and have then cooled and crystallized as our present gneiss. The materials are Pre-Grenville, but the gneiss is later in age.

That the Hastings and Grenville series occupy the same position between the Laurentian and the Palæozoic sediments as the Keewatin and much of the Huronian seems certain, and that they were formed under not unlike conditions is probable; but that the Hastings and Grenville series are the exact equivalents of either the lower or upper Huronian is uncertain, though one naturally thinks of them as formed during the time which elapsed between the beginning of the Coutchiching and the completion of the upper Huronian.

---

[1] Am. Jour. Sc., Vol. III., Mar., 1897, p. 176.

THE ALGONKIAN QUESTION.

The relationships of the rocks called by the American Geological Survey Algonkian with the rocks classed by Canadians as Huronian or Keewatin have long been in dispute, though appearances now point to a reconciliation between the two schools of Pre-Cambrian geology. The origin of the differences of opinion and of nomenclature may be traced to Irving's views as to the equivalence of the Penokie iron range rocks with the Huronian and with the Animikie of Thunder bay.[1] Logan had shown that the Animikie and also the Huronian occur on the shore of Thunder bay, and Irving in his brief visit to the region overlooked the fact that the almost horizontal Animikie slates and cherts lie unconformably over the steeply tilted Huronian schists along the shore of the bay, and jumped to the conclusion that the two series of rocks are the same. Logically enough, he included the Vermilion iron range also, since that is in reality the southwestward extension of the Huronian at Thunder bay. His visit to the slightly tilted and not greatly metamorphosed Huronian strata on the north shore of Lake Huron seems to have misled him into the belief that the Huronian as a whole was little tilted or altered. In reality, instead of being equivalent, the Animikie and Huronian are separated by the profoundest gap known in geological history, the Eparchæan Interval, as Lawson has named it, and this has been recognized ever since Logan's time in Canada and also by the Minnesota survey.

The Algonkian was founded to include all Pre-Cambrian sediments, the Fundamental complex underlying it being looked on as of eruptive origin. As the main defender of the classification, Professor Van Hise, has recently admitted that the Vermilion and Michipicoton iron ranges, which are undoubtedly of sedimentary origin, are of pre-Algonkian age, it is evident that a rearrangement of the classification and of the nomenclature is demanded.[2] Unfortunately,

---

[1] U.S. Geol. Sur., 3rd An. Rep., 170, etc.

[2] U.S. Geol. Sur., Iron-ore Deposits of the Lake Superior Region, 1901, p. 317.

Professor Van Hise has not accepted the arrangement in use in Canada and Minnesota, but puts the Keewatin or lower Huronian in the Archæan, and leaves the upper Huronian and Animikie in the Algonkian. He has cut the Vermilion rocks out of the unnatural association given them by Irving, but still retains the other error of placing the upper Huronian and Animikie as equivalents. How illogical this position is has been shown by Willmott, Lawson, and myself,[1] and it will be unnecessary to discuss the matter here. The inclusion of the Animikie with the Huronian rested on an error in the beginning and should not be continued by the American survey. Whether it will be worth while to retain the name Algonkian as representing the upper Huronian alone or the Animikie and Keweenawan seems doubtful. The latter rocks look very modern and the finding of fossils may at any time relegate them to the Cambrian. There seems no excuse for renaming so well known a group of rocks as the upper Huronian, which bore their present name for a generation before the introduction of the term Algonkian.

As the American geologists working south and west of Lake Superior have at last recognized the same number of Pre-Cambrian formations as ourselves, with the same gaps between them, and have in at least one case carried their work up to the boundary where it connects with ours, they should do away with the confusion which has so long reigned and accept the Canadian nomenclature, which has the right of priority.

CLASSIFICATION OF THE ARCHÆAN.

The ground is now cleared to compare the various systems of classification and nomenclature of the Pre-Cambrian. The earliest subdivision into Laurentian and Huronian will naturally be retained, but with the explanation that the name Laurentian applies only to the Ottawa gneiss or the Fundamental gneiss, a complex of eruptives now mainly schistose and of later consolidation than the Huronian in most, if not all, regions. It is better that the Hastings and Grenville series should be separated from the Laurentian as older than the underlying gneisses and probably equivalent in age to part or all of the Keewatin and Huronian.

A number of systems of classification have been proposed and may now be compared. After the great break between the upper and lower Huronian, and also between the upper and lower Keewatin was made clear, it became necessary to recognize this in the classification; and the Bureau of Mines of Ontario has adopted the following arrangement for the Archæan in the Michipicoton iron region[1]:

---

[1] Nomenclature of the L. Superior Formations, Willmott, Jour. Geol., Vol. 10, No. 1, 1902, pp.68-76; The Eparchæan Interval, Lawson, Univ. Cal. Pubs., Vol. 3, No. 3, pp. 51-62; and The Huronian Question, Coleman, Am. Geol., Vol. XXIX., No. 6, pp. 325-334.

LAURENTIAN—Gneisses and granites.
UPPER HURONIAN—Basal conglomerate.
LOWER HURONIAN—{ Iron range rocks.
  Tuffs and eruptives.

If this classification is to be extended to cover the Archæan generally, the Eparchæan Interval should come above the Laurentian, and above that should be placed the Animikie and Keweenawan.

Lawson in his last paper on the Archæan gives a more elaborate scheme of classification for the Lake Superior region.[2]

PALÆOZOIC { CAMBRIAN (upper division or Potsdam only).
    Unconformity.
  ALGONKIAN—{ Keweenawan
      Unconformity.
    Animikie = Penokee = Upper Marquette.

Eparchæan Interval.

ARCHÆAN { HURONIAN = Upper Keewatin = Lower Marquette, etc.
    Unconformity.
  LAURENTIAN, so called, granite gneisses, etc., (intrusive in the Ontarian) and the Carltonian anorthosites.
  ONTARIAN—{ Keewatin = Lower Huronian = Crystalline schists of south shore invaded by granite-gneisses.
      Unconformity.
    Coutchiching.

Van Hise in his latest publication uses the following classification of the formations[3]:

CAMBRIAN,
  (Unconformity).
KEWEENAWAN,
  (Unconformity).
UPPER HURONIAN (= Penokee-Gogebic = Animikie),
  (Unconformity).
LOWER HURONIAN (= Upper Huronian or Keewatin of Ontario),
  (Unconformity).
ARCHÆAN (Vermilion series, including Soudan iron formation, certain schists and intrusive granite and gneiss = Lower Huronian or Keewatin Ontario with Laurentian).

In the arrangement given above three successions have been combined, omitting the local applications and adding the equivalent terms as recognized in Ontario. The unconformities are of very unequal importance, the one below the upper Huronian (=Animikie) being the Eparchæan Interval, and the one beneath the lower Huronian (=Upper Huronian) being the next in importance. The gneisses, etc., of the Laurentian are not given a separate formational name, probably because as eruptives they were not considered entitled to one.

---

[1] Bur. Mines, 1902, p. 185.

[2] Univ. Cal., Vol. 3, No. 3, p. 61.

[3] U.S. Geol. Sur., 21st An. Rep., p. 338, p. 385 and p. 402.

If we fill out the Bureau of Mines classification to the form of the other two and omit the Cambrian in which all are alike, the three compare as follows:

BUREAU OF MINES	LAWSON	VAN HISE
Keweenawan	**Keweenawan**	**Keweenawan**
(Unconformity)	(Unconformity)	(Unconformity)
Animikie	**Animikie**	**Upper Huronian**
(Unconformity)	(Unconformity)	(Unconformity)
{Laurentian (Eruptive unconformity)}		
Upper Huronian	**Huronian**	**Lower Huronian**
(Unconformity)	= Upper Keewatin (Unconformity)	(Unconformity)
	{Laurentian, so-called}	
Lower Huronian	**Ontarian**	**Archæan**
(including Iron Range, pyroclastic schists and eruptives)	(including Keewatin (Unconformity) and Coutchiching)	(including Vermilion series, schists and gneisses)

It is apparent that if the Laurentian gneisses be left out as eruptives the three classifications correspond very closely both as to formations and as to unconformities, though, after the Keweenawan, the nomenclature of the third column has each name shifted one place upward as compared with the other two, the Archæan taking the place of the lower Huronian or Ontarian. It is understood, of course, that the whole series is included in the Archæan in the first two columns, and all but the last is included in the Algonkian in the third.

The differences between the first and second columns are chiefly in regard to the place of the Laurentian and the occurrence of an unconformity between the Keewatin and the Coutchiching. At Michipicoton and in many other Huronian localities there is no doubt that the Laurentian is later than the upper Huronian, as shown in former pages; though at one point on Lake Temiscaming, and perhaps also on Lake Huron, the granite and gneiss seem older than the upper Huronian; so that possibly both arrangements may be right at different points, the first, however, being the prevalent one.

With regard to the break between the Keewatin and the Coutchiching, my own observations have not shown it to be important, though Lawson's detailed work in the region should give his opinion on the subject far more weight than mine. I thoroughly agree with him, however, that a series of gray mica schists and gneisses of sedimentary origin can be separated from the prevailingly eruptive Keewatin rocks in many localities.

The iron range rocks, which form the upper part of the lower Huronian in many places, if not all, have not been provided for in his subdivisions, since the Keewatin group is defined as mainly or entirely of eruptive origin. Though they are not usually of great thickness, they form an easily recognized horizon and are of great practical importance. On Grassy Portage bay of Rainy lake and near Wabigoon to the north, rocks of the iron range are associated with characteristic Coutchiching schists, while at other points, as at Michipicoton, the associated rocks are sheared eruptives and pyroclastics which may properly be called Keewatin.

Is it not possible that the Coutchiching, is the true lower Huronian and that the Keewatin series, being eruptive, is accidental in its occurrence, sometimes lying above the Coutchiching, sometimes intercalated with it, and sometimes replacing it altogether?

The name Ontarian to include the Keewatin and Coutchiching seems very suitable, since the province of Ontario contains the best examples of these rocks; but there are two objections to it, perhaps, however, of little importance. The name, I am informed, has been given to a fossiliferous formation in the United States, though whether it has priority or not, I cannot say, not having a copy of the report in which it was described. The other objection is that the name was not published in the reports on the areas where the Keewatin and Coutchiching were first described, so that the two latter terms, especially Keewatin, already hold the field in the literature. Both in Ontario and Minnesota the term Keewatin has often been used to replace lower Huronian and is now found on many of the maps of the Archæan. It might, therefore, be better to use Keewatin as the general term including the whole lower Huronian instead of Ontarian, and to give a fresh designation to the eruptives and pyroclastics.

While the propriety of separating the lower part of the Archæan from the Huronian as Keewatin or Ontarian is quite clear in view of the extensive unconformity between them; there is a practical reason in favour of retaining the old terms of upper and lower Huronian. In many cases it is difficult or impossible to determine in the field which group is actually present, and a general term including both will long be necessary in reconnaissance work. This will apply also to the Hastings and Grenville series, formerly considered as Laurentian, but now properly to be classed as older than the Laurentian and equivalent to the upper or lower Huronian. Which of the two formations they should be placed with is at present uncertain, so that here also a general term like Huronian, including both divisions is desirable.

Though the difficulties are not all removed we are now closer to unanimity than ever before, and possibly a compromise classification like the following may be found to serve the present needs:

MIDDLE AND LOWER CAMBRIAN ? OR ALGONKIAN ?	Keweenawan, (Unconformity). Animikie.

EPARCHÆAN INTERVAL.

ARCHÆAN	Laurentian = Fundamental Gneiss, etc. (Eruptive unconformity).				
	HURONIAN	Upper Huronian or Huronian proper, (Unconformity). Lower Huronian		=	Grenville and Hastings series.
		or Keewatin	Schistose pyroclastics and eruptives Coutchiching.		

VII.—*Bibliography of Canadian Zoology for 1900, exclusive of Entomology.— Supplement.*

By DR. J. F. WHITEAVES.

(Read May 27, 1902.)

(BIRDS.)

Check List of the Birds of Ontario and Catalogue of Birds in the Biological Section of the Museum.

By W. C. Nash.

8vo., pp. 58. Published, in 1900, by the Department of Education, Toronto.

From the Auk, Vol. xvii.

The Occurrence of Steller's Eider (*Eniconetta Stelleri*) in the Gulf of St. Lawrence.

By A. K. Fisher.

Notes on some of the Birds of British Columbia.

By Allan Brooks.

The Flicker wintering in Montreal.

By J. B. Williams.

Ontario Bird Notes.

By James H. Fleming.

New Brunswick (Bird) Notes.

By W. H. Moore.

Occurrence of the Little Blue Heron in Labrador.

By Outram Bangs.

The Western Red-tail at Toronto, Canada: and List of the Rarer Birds met with during the Spring of 1900 in the Immediate Vicinity of Toronto.

By J. Hughes Samuel.

VIII.—*Bibliography of Canadian Zoology for 1901, exclusive of Entomology.*

By DR. J. F. WHITEAVES.

(Read May 27, 1902.)

(MAMMALIA.)

The Extinction of the Elk in Ontario.
By L. H. Smith.
Ottawa Naturalist, July, 1901, Vol. xv, No. 4, pp. 95-97.

La Baleine de Montréal.
By Rév. Abbé V. A. Huard.
Le Naturaliste Canadien, Nov. 1901, Vol. xxviii, pp. 183-185.
Records the occurrence of *Balænoptera physalus* at Montreal.

(BIRDS.)

The Nesting of the Cerulean Warbler.
By W. E. Saunders.
Ottawa Naturalist, Jan., 1901, Vol. xiv, No. 10, pp. 183-185.

Notes on the Acadian Owl (*Nyctale Acadica*) in captivity.
By F. Norman Beattie.
Ottawa Naturalist, Feb., 1901, Vol. xiv, No. xi, pp. 218-220.

A New Song for a Common Bird.
By W. E. Saunders.
Ottawa Naturalist, March, 1901, Vol. xiv, No. 12, pp. 224-226.

Two Warblers new to Canada.
By W. L. Kells.
Ottawa Naturalist, March, 1901, Vol. xiv, No. 12, pp. 230-234.
Records the capture of a specimen each of Kirtland's Warbler (*Dendroica Kirtlandi*) and the Prairie Warbler (*D. discolor*) near Toronto, by Mr. J. H. Samuel.

The Hudsonian Curlew in Middlesex Co., Ont.
By W. E. Saunders.
Ottawa Naturalist, March, 1901, Vol. xiv, No. 12, p. 234.

Bird Notes from Point Pelee, Ontario.
By Harry Gould.
Ottawa Naturalist, April, 1901, Vol. xv, No. 1, pp. 15 and 16.

Bird Notes.

By W. T. Macoun.

Ottawa Naturalist, May, 1901, Vol. xv, No. 2, pp. 53 and 54.

A record of birds seen near Ottawa from Jan. 12 to April 23, 1901.

Ross's Gull.

By Professor E. E. Prince.

Ottawa Naturalist, May, 1901, Vol. xv, No. 2, pp. 55 and 56.

The Golden Eagle. An addition to the Fauna of Middlesex County.

By J. E. Keays.

Ottawa Naturalist, May, 1901, Vol. xv, No. 2, pp. 56 and 57.

Cory's Least Bittern (*Botaurus neoxenus*, Cory).

By W. L. Kells.

Ottawa Naturalist, June, 1901, Vol. xv, No. 3, pp. 67-70.

Ornithological Notes.

By W. T. Macoun.

Ottawa Naturalist, June, 1901, Vol. xv, No. 3, pp. 89-93.

Notes the arrivals of various birds in 1901 at localities in Canada and Michigan, and near Ottawa in April and May, 1901.

Ornithological Notes (continued).

By W. T. Macoun.

Ottawa Naturalist, July, 1901, Vol. xv, No. 4, pp. 112 and 113.

Records the arrivals of fifty-six species of birds at four localities in Ontario, in May, 1901.

Tryngites rufescens, Buff-breasted Sandpiper.

By G. A. McCallum.

Ottawa Naturalist, August, 1901, Vol. xv, No. 5, pp. 127 and 128.

Records the nesting of this species near Dunnville, Haldimand Co., Ont.

The Woodcock's Love Song.

By L. H. Smith.

Ottawa Naturalist, August, 1901, Vol. xv, No. 5, p. 129.

Notes on the Winter Birds of the Cariboo District, B.C.

By Allan Brooks.

Ottawa Naturalist, Sept., 1901, Vol. xv, No. 6, pp. 152-154.

Some of the Birds of Algoma.

By C. T. Scott.

Ottawa Naturalist, Oct., 1901, Vol. xv, No. 7, pp. 155-161.

Notes on the Woodcock's Love Song.

By W. H. Moore.

Ottawa Naturalist, Dec., 1901, Vol. xv, No. 9, p. 195.

The King Eider in Middlesex County.

By Robert Elliott.

Ottawa Naturalist, Dec., 1901, Vol. xv, No. 9, pp. 198-199.

Autumn Notes on Birds, Sable Island, N.S., 1901.
By Richard Boutelier.
Ottawa Naturalist, Dec., 1901, Vol. xv, No. 9, pp. 199 and 200.

The Glaucous Gull in Middlesex County.
By W. E. Saunders.
Ottawa Naturalist, Dec., 1901, Vol. xv, No. 9, p. 200.

Natural History Notes.
By William Yates.
Journal and Proceedings of the Hamilton Scientific Association, Session 1900-1901, pp. 99-106.

Contains some observations on Canadian birds.

A List of Birds of the Districts of Parry Sound and Muskoka, Ontario.
By James H. Fleming.
The Auk, Jan., 1901, Vol. xviii, pp. 33-45. And, corrections to do., in the same journal for July, 1901.

Nesting of Cory's Bittern at Toronto, Ont.
By James H. Fleming.
The Auk, Jan., 1901, Vol. xviii, p. 106.

Nesting of Cory's Bittern (*Ardetta neoxena*) and Other Notes.
By J. H. Ames.
The Auk, Jan., 1901, Vol. xviii, p. 106.

(Bird) Notes from Ontario.
By Dr. C. K. Clarke.
The Auk, Jan., 1901, Vol. xviii, p. 112, and Oct., 1901, Vol. xviii, pp. 401 and 402.

The Passenger Pigeon.
By G. C. Tremaine Ward.
The Auk, April, 1901, Vol. xviii, pp. 191 and 192.

The Loggerhead Shrike in New Brunswick.
By W. H. Moore.
The Auk, April, 1901, Vol. xviii, p. 201.

(Bird) Notes from the Magdalen Islands.
By the Rev. Herbert K. Job.
The Auk, April, 1901, Vol. xviii, pp. 199 and 200.

New Brunswick (Bird) Notes.
By W. H. Moore.
The Auk, April, 1901, Vol. xviii, p. 201.

The Snowy Heron in Alberta.
By G. F. Dippie.
The Auk, Oct., 1901, Vol. xviii, p. 392.

La faune des Oiseaux de la province de Québec.
By Sir J. M. Lemoine.
Le Naturaliste Canadien for Oct., 1901, Vol. xxviii, pp. 148-152.

REPTILIA.

Note on the Oviposition of the Mud Turtle.
By Mailes Cowley.
Ottawa Naturalist. Dec., 1901, Vol. xv, No. 9, pp. 108 and 109.

Alligators and Turtles as Pets.
By W. S. Odell.
Ottawa Naturalist, Dec., 1901, Vol. xv, No. 9, pp. 193-195.

Rattlesnakes and Scorpions.
By J. R. Anderson.
Ottawa Naturalist, Oct., 1901, Vol. xv, No. 7, pp. 162 and 163.

FISHES.

The Effects of Polluted Water on Fish-Life.
By Dr. A. P. Knight.
Suppl. to the 23rd Ann. Rep. of the Canadian Department of Marine and Fisheries. Fisheries Branch, pp. 9-18.

The Paired Fins of the Mackerel Shark (*Lamna*).
By Prof. E. E. Prince and Dr. A. H. MacKay.
Suppl. to the 23rd Ann. Rep. of the Canadian Department of Marine and Fisheries, Fisheries Branch, pp. 55-58, pls. v, vi and vii.

The Sardine Industry in relation to the Canadian Herring Fisheries.
By R. Arthur Bensley.
Suppl. to the 23rd Ann. Rep. of the Canadian Department of Marine and Fisheries, Fisheries Branch, pp. 59-62.

Du nouveau concernant la question de l'Anguille.
By Rev. Abbé V. A. Huard.
Le Naturaliste Canadien for Jan. 1901, Vol. xxviii, p. 59.

L'Anguille, est elle vivipare?
By Rev. Abbé V. A. Huard.
Le Naturaliste Canadien for August, 1901, Vol. xxviii, pp. 114 and 115.

Powers of Adaptation in Fishes.
By Professor E. E. Prince.
Ottawa Naturalist for Feb., 1901, Vol. xiv, No. xi, pp. 212-217.

An African Dipnoid Fish.
By Andrew Halkett.
Ottawa Naturalist, Nov., 1901, Vol. xv, No. 8, pp. 184-187.

INVERTEBRATA.

Catalogue of the Marine Invertebrata of Eastern Canada.

By J. F. Whiteaves.

Geological Survey of Canada, publication No. 722, pp. 1-272, with two woodcuts in the text.

Review of a "Catalogue of the Marine Invertebrata of Eastern Canada."

By E. E. P(rince).

Ottawa Naturalist, Oct., 1901, Vol. xv, No. 7, pp. 165-172.

A "Note on some Errata" in this Review was published in the Ottawa Naturalist for Nov., 1901.

Notes on some Land and Fresh-water Mollusca from Fort Chimo, Ungava Bay, Ungava.

By J. F. Whiteaves.

Ottawa Naturalist, March, 1901, Vol. xiv., No. 12, pp. 221-223.

The Clam Fishery of Passamaquoddy Bay.

By Dr. Joseph Stafford.

Supplement to the 32nd Ann. Rep. of the Canadian Department of Marine and Fisheries, Fisheries Branch, pp. 19-40, pls i-iv.

The Food of the Sea Urchin (*Strongylocentrotus*).

By Dr. F. H. Scott.

Supplement to the 32nd Ann. Rep. of the Canadian Department of Marine and Fisheries, Fisheries Branch, pp. 49-64.

MISCELLANEOUS.

Account of the Marine Biological Station of Canada; its Foundation, Equipment and Work.

By Professor E. E. Prince.

Supplement to the 32nd Ann. Rep. of the Canadian Department of Marine and Fisheries, Fisheries Branch, pp. 1-8.

La Station de biologie marine du Canada.

By Rev. Abbé V. A. Huard.

Le Naturaliste Canadien for March, 1901, Vol. xxviii, pp. 33 and 34; and for July, 1901, Vol. xxviii, pp. 97 and 98.

The Canadian Marine Biological Station.

By F. Slater Jackson, M.D.

Canadian Record of Science, Jan., 1901, Vol. VIII, No. 5, pp. 308-314.

IX.—*Botanical Bibliography of Canada, 1901.*

BY A. H. MACKAY, LL.D.

(Read May 27, 1902.)

ANDERSON, J. R.

Brue or Soap Berry, in The Ottawa Naturalist, Vol. xv., No. 8, pp. 188, 189, November, 1901, Ottawa.

CAMPBELL, ROBERT.

Additional Notes on the Flora of Cap-à-L'Aigle; reprinted from Canadian Record of Science, Vol. viii., No. 5, pp. 281-295. January, 1901, Montreal.

CAMPBELL, ROBERT.

The Flora of Montreal Island; reprinted from Canadian Record of Science, Vol. viii., No. 6, pp. 349-365. August, 1901, Montreal.

CARRIER, J. C.

La Flore de l'Ile de Montréal, dans le Bulletin de l'Académie internationale de Géographie botanique, 10 Année (3 Serie), N. 140, 141, 142, 143, 145 (pp. 166-283), July—December, 1901. Le Mans (Sarthe), France. (Awarded the International medal for 1901.)

CRAWFORD, MATTIE ROSE, *et al.*

Guide to Nature Study, containing botanical studies within its 350 pages, 5.5 x 8 inches. The Copp Clark Company, Toronto, 1901.

DAWSON, MISS M.

On the Structure of "Indian Soap." in Transactions of Canadian Institute, pp. 1-6, No. 13, pt. 1, Vol. vii., Toronto, August, 1901.

DEARNESS, JOHN.

An Hour's Botanizing on the Mountain (Montreal) Side; reprinted from Canadian Record of Science, Vol. viii., No. 5, pp. 306 and 307, January, 1901, Montreal.

Also Edible Fungi, in Canadian Horticulturist, 1901.

D'HERELLE, F.

De la Formation du Carbone par les Vegetaux, dans le Naturaliste canadien, pp. 70—75, No. 5, Vol. xxviii. Mai, 1901, Québec.

DOHERTY, M. W.

New Species of *Trimmatostroma*; reprinted from the Botanical Gazette, pp. 400 to 403, Vol. xxx. December, 1901, Chicago.

PAUL, J. H.

The Anatomy of the Osmundaceæ; reprinted from the Botanical Gazette, pp. 35—71, Vol. xxxii. 1901. Chicago. (University of Toronto Studies, Biological Series, No. 2.)

FLETCHER, JAMES.

Nature-Study in Education; reprinted from Transactions, Royal Society of Canada, 2nd Series, Vol. vii., Section iv., pp. 151—159. May, 1901, Ottawa.

FOWLER, JAMES.

Report on the Flora of St. Andrews, N.B.; No. iv. in Contributions to Canadian Biology, from "Studies from the Marine Biological Station of Canada, 1901" (in Supplement to the 32nd Annual Report of the Department of Marine and Fisheries, Fisheries Branch), pp. 41—48, 1901, Ottawa.

GANONG, W. F.

Notes on the Natural History and Physiography of New Brunswick (occasional allusions to the Botany), in Bulletin, Nat. Hist. Soc. of New Brunswick, Vol. iv., pt. v., No. xx., pp. 427—471, 1901, Saint John.

GREENE, EDWARD L.

New Plants from Alberta, in The Ottawa Naturalist, Vol. xv., No. 2, p. 42. May, 1901.

GREENE, EDWARD L.

Certain Canadian Violets, in The Ottawa Naturalist, Vol. xv., No. 9, pp. 191-192. December, 1901.

GUILLET, CEPHAS.

On the Autumn-Flowering of various Wild Plants in 1900, in the Ottawa Naturalist, Vol. xv., No. 5, pp. 123—126. August, 1901.

HAMILTON, SCIENCE ASSOCIATION,

Report of Committee, Biological Section, 1900-1901, in Journals and Proceedings, No. xvii., pp. 99 and 100; Hamilton, Ontario, 1901.

HAY, GEO. U.

The South Tobique Lakes (with many botanical observations), in Bulletin Nat. Hist. Soc. of New Brunswick, Vol. iv., pt. v., No. xx., pp. 472—482, 1901, Saint John.

Also, Report of the Committee on the Botany of N.B., *ibid*, pp. 496-498.

Also, Observations on Plants in Wild Garden, Ingleside, N.B., *ibid*, pp. 499-500.

HOLM, THEO.

Allies of *Stellaria media* (L.) Cyrillo; in The Ottawa Naturalist, Vol. xv., No. 2, pp. 37—41. May, 1901.

Also, Some New Canadian Gentians, *ibid*, No. 4, pp. 110 and 111. July, 1901.

Also, On Some Canadian Species of Gentian; Sectio Crossopetalæ, Froel, *ibid*, No. 8, pp. 175—182. November, 1901, Ottawa.

HUARD, V. A.

Les Plantes normandes au Canada, dans le Naturaliste canadien, p. 132, No. 9, Vol. xxviii., 1901, Québec.

JEFFREY, EDWARD C.

Infranodal Organs in Calamites and Dicotyledons, from Annals of Botany, Vol. xv., No. lvii., pp. 135—145. March, 1901, London.

JEFFREY, EDWARD C.

The Anatomy and Development of the Stem in Pteridophyta and Gymnosperms—an abstract from Proc. Royal Soc., Vol. 69, pp. 119 and 120. July, 1901. London.

LAFLAMME, C.

Jacques-Philippe Cornuti, Note pour servir à L'Histoire des Sciences au Canada; reprint from Trans. Roy. Soc. Can., 2nd Series, Vol. vii., Sec. iv., pp. 57—72. May, 1901, Ottawa.

LEMAY, P.

La Flore du Labrador, dans le Naturaliste canadien, Vol. xxviii, No. 7, p. 107, 1901, Québec.

MACKAY, A. H.

1:—Phenological Observations of the Botanical Club of Canada, 1900.
2:—Abstract of Phenological Observations on the Flowering of Ten Plants in Nova Scotia, 1900; with
3:—Remarks on their Phenochrons;
reprinted from the Transactions of the N. S. Institute of Science, Vol. x., pp. 379—398. May, 1901, Halifax.

MACKAY, A. H.

Report of the Botanical Club of Canada; reprinted from the Proceedings of the Royal Society of Canada, Second Series, vol. vii., p. 10. May, 1901, Ottawa.

MACOUN, JAMES M.

Botanical Notes, in The Ottawa Naturalist, Vol. xv., No. 1, p. 14. April, 1901.
Also, *ibid*, No. 7, p. 164. October, 1901.
Also, Contributions to Canadian Botany, *ibid*, No. 3, pp. 77—79. June, 1901, Ottawa.

MATTHEW, G. F.

Are the Saint John Plant Beds Carboniferous? The American Geologist, Vol. 27, pp. 383—386, Minneapolis, Minn., U.S.A., 1901. (Reviewed by H. M. Ami, in The Ottawa Naturalist, Vol. xv., No. 12, p. 286. March, 1902.)

MCSWAIN, JOHN.

The Forest Trees of Prince Edward Island, in Halifax Herald, 21st September, 1901, (2700) words), Halifax.

MULDREW, W. H.

Sylvan Ontario, a Guide to our Native Trees and Shrubs, 64 pp., 7 x 9 inches (12 pp. of illustrations—leaf forms). William Briggs, Toronto, 1901.

PENHALLOW, D. P.

Notes on the North American Species of Dadoxylon, with special reference to type material in the Collections of the Peter Redpath Museum, McGill University, in Trans. Roy. Soc. of Can., 2nd Series, Vol. vii., Sec. iv., pp. 51—97, 1901, Ottawa.

PENHALLOW, D. P.

Review of "Studies in Fossil Botany by Dunkenfield, Henry Scott, 533 pp. (illustrated), London, England, 1901," in Science, New Series, Vol. 13, No. 323, pp. 386—389. 8th March, 1901.

PENHALLOW, D. P.

Appendix to Groom's Elementary Botany, containing a Key to the Common Plants of Eastern Canada. The Copp Clark Company, Toronto, 1901.

POOLE, H. S.

Stigmaria Structure (with Photomicrographs); reprinted from Transactions of the Nova Scotian Institute of Science, Vol. x., pp. 345—347. May, 1901, Halifax.

SARGENT, C. S.

Notes on Cratægus in the Champlain Valley, from Rhodora, Vol. 3, No. 26, pp. 21—31. February, 1901, Boston.

SARGENT, C. S.

New or little known North American Trees, II. and III.; reprinted from Botanical Gazette, Vol. xxxi. January, pp. 1—16, and April, pp. 217—240, 1901, Chicago.

SARGENT, C. S.

Notes on a Collection of Cratægus made in the Province of Quebec near Montreal; reprinted from Rhodora, Vol. 3, No. 28, pp. 71—78. April, 1901, Boston.

WATSON LAWRENCE W.

Sarracenia and Drosera in Prince Edward Island Magazine, Vol. iii., No. 1, pp. 1—5. March, 1901, Charlottetown.

WHITE, DAVID.

Some Palæobotanical Aspects of the Upper Palæozoic in Nova Scotia, in the Canadian Record of Science, Vol. viii., No. 5, pp. 271—280. January, 1901, Montreal.

WHITE, DAVID.

The Canadian Species of the Genus *Whittleseya*, and their systematic Relations, in the Ottawa Naturalist, Vol. xv., No. 4, pp. 98—110. July, 1901, Ottawa.

X.—*Bibliography of Canadian Entomology for the Year 1901.*

(Contributed by REV. C. J. S. BETHUNE, D.C.L., and read May 27, 1902.)

BEAULIEU, GERMAIN.—Scarabéides de la Province de Québec. Le Naturaliste Canadien, XXVIII, 20-23 (Feb.); ib. 83-86 (June); ib. 99-102 (July, 1901).

BETHUNE, C. J. S.—General Index to the Thirty Annual Reports of the Entomological Society of Ontario, 1870—1899; pp. 76. Published by the Ontario Department of Agriculture, Toronto, 1900.

BETHUNE, C. J. S.—Editorial Notes and Reviews. Can. Ent., XXXIII, passim (1901); 31st Annual Report, Ent. Soc., Ontario, 1900.

BIRD, HENRY.—New Histories in Hydræcia (describes fully the habits, larvæ, etc., of *H. inquæsita* and *limpida*). Can. Ent., XXXIII, 61-68 (March, 1901).

BRADLEY, J. CHESTER.—The Evaniidæ of America North of Mexico. Transactions American Entomological Society, Philadelphia, XXVII, 319-330, plate XI (Nov., 1901). (Descriptions of the following Canadian genera and species: *Oleisoprister resutorivorus* and *O. Abbottii*; *Aulacus rufitarsus*; *Pammegischia Oullettii*, Joliette, P.Q., and *P. Burquei*, St. Hyacinthe, P.Q.)

BRADLEY, J. CHESTER.—The North American Oryssidæ. Transactions Amer. Ent. Soc., Philadelphia, XXVII, 317-318 (Nov., 1901). (Descriptions of the genus and species *Oryssus terminalis* and *O. Sayi* from Canada.)

BUSCK, AUGUST.—A new Canadian Tineid. (Description of *Anacampsis lupinella*). Can. Ent., XXXIII, 14-15 (Jan., 1901).

CHAGNON, GUSTAVE.—Etudes préliminaires sur les Syrphidæ de la Province de Québec. Le Naturaliste Canadien, XXVIII (VII nouvelle série), 10-14 (Jan.); ib. 23-27 (Feb.); ib. 41-45 (March); ib. 55-59 (Apr.); ib. 76-78 (May); ib. 86-91 (June); ib. 102-106 (July); ib. 118-126 (Aug.); ib. 134-142 (Sept.); ib. 152-159 (Oct.); ib. 168-183 (Nov., 1901).

CHAGNON, GUSTAVE.—Preliminary List of Canadian Diptera. Entomological Student, Philadelphia, II, 5-8 (Feb.); ib. 13-15 (March, 1901).

CHAPAIS, J. C.—L'Aphis des pois (*Nectarophora destructor*). Le Naturaliste Canadien, XXVIII, 17-20 (Feb., 1901).

COCKERELL, T. D. A.—The American Bees of the genus Andrena described by F. Smith. Can. Ent., XXXIII, 123-4 (April); ib. 149-155 (May,

COX, D. G.—Notes on Insects of the Year. 31st Annual Report, Ent. Soc., Ontario, 1900, pp. 39-40.

DEARNESS, JOHN.—A parasite of the San José Scale. 31st Annual Report, Ent. Soc. Ontario, 1900, pp. 87-88.

Dod, E. H. Wolley, Preliminary List of the Macro-Lepidoptera of Alberta, N.W.T. Can. Ent., XXXIII, 40-42 (Feb.); ib. 157-172 (June, 1901).

Dod, E. H. Wolley.—*Pyrameis cardui* (Unusual abundance of this butterfly). Can. Ent., XXXIII, 237 (Aug., 1901).

Dodge, G. M. and E. A.—Notes on the early stages of Catocalæ. Can. Ent., XXXIII, 221-226 (August); ib. 298-300 (Nov., 1901).

Dyar, Harrison G.—Notes on the genitalia of *Halisidota Harrisii*, Walsh. Can. Ent., XXXIII, 30 (Feb., 1901). figs.

Dyar, Harrison G.—On certain identifications in the genus Acronycta. Can. Ent., XXXIII, 122 (April); ib. 191-2 (July, 1901).

Evans, J. D.—Notes on Insects of the Year. 31st Annual Report, Ent. Soc., Ontario, 1900, p. 39.

Fisher, George E.—Report of the Inspector of San José Scale, 1900. Annual Report Ontario Department of Agriculture for 1900, Toronto, 1901; Vol. I, No. 49, pp. 20 (plate).

Fisher, George E.—The San José Scale. 31st Annual Report, Ent. Soc. Ontario, 1900, pp. 26-28.

Fisher, George E.—Remedies for the San José Scale. Farmer's Advocate, XXXVI, 125 (Feb. 15, 1901).

Fisher, George E.—Fighting the San José Scale. 32nd Annual Report Ontario Fruit Growers' Association, 1900, pp. 113-122.

Fleming, W. M.—Silk Culture in Canada. Farmer's Advocate, XXXVI, 124 (Feb. 15, 1901).

Fletcher, James.—Report of the Entomologist and Botanist. Experimental Farms Report, 1900, pp. 195-249 (18 figures).

Fletcher, James.—Farm pests; fodder grasses. Evidence before the Select Standing Committee on Agriculture and Colonization, House of Commons, Ottawa, March 19, 1901, pp. 25.

Fletcher, James.—Injurious Insects in Ontario during 1900. 31st Annual Report, Ent. Soc. Ontario, 1900, pp. 62-72 (figures).

Fletcher, James.—The Value of Bees in Fruit Orchards. Annual Report of the Bee-keepers' Association of Ontario, 1901, pp. 56-63.

Fletcher, James.—Description of the full-grown larva of *Anacampsis lupinella*. Can. Ent., XXXIII, 15-16 (Jan., 1901).

Fletcher, James.—Practical Entomology (Review of Dr. L. O. Howard's Study of the Insect Fauna of Human Excrement). Can. Ent., XXXIII, 84-88 (March, 1901).

Fletcher, James.—Life history of the greenhouse Leaf-tyer. *Phlyctænia ferrugalis*. Can. Ent., XXXIII, 140-144 (May, 1901).

FLETCHER, JAMES.—Farmers' Friends and Foes (a series containing 60 replies concerning noxious and beneficial insects). Montreal Weekly Star, 1901.

FLETCHER, JAMES.—The Hessian Fly. Montreal Weekly Star, April 3, 1901.

FLETCHER, JAMES.—The Pea Weevil. Montreal Weekly Star, April, 17, 1901.

FLETCHER, JAMES.—Fleas and Bedbugs. Montreal Weekly Star, May 20, 1901.

FLETCHER, JAMES.—Black Vine-Weevil (*Otiorhynchus sulcatus*) attacking Strawberries. Montreal Weekly Star, May 30, 1901.

FLETCHER, JAMES.—The Powder Post Beetle. Montreal Weekly Star, Nov. 6, 1901.

FLETCHER, JAMES,—The Peach-tree Borer. Montreal Weekly Star, Nov. 13, 1901.

FLETCHER, JAMES,—Ants in houses. Montreal Weekly Star, Nov. 20, 1901.

FLETCHER, JAMES.—The Hawk Louse-fly (*Olfersia Americana*). Montreal Weekly Star, Dec. 11, 1901.

FLETCHER, JAMES,—The San José Scale in Ohio and Ontario. Montreal Weekly Star, Dec. 18, 1901.

FLETCHER, JAMES,—A Cattle Tick (*Boophilus bovis?*). Farmer's Advocate, XXXVI, 304 (May 1, 1901).

FLETCHER, JAMES,—Invasion of Box-elder Bug (*Leptocoris trivittatus*). Nor-West Farmer, Nov. 5, 1901, p. 694.

FLETCHER, JAMES,—A Currant Maggot (*Epochra?*). Nor-West Farmer, Dec. 5, 1901, p. 751.

FRENCH, G. H.—Revision of the genus Catocala. Can. Ent., XXXIII, 12-14 (Jan.); ib. 205-207 (July, 1901).

FYLES, T. W.—Annual Address of the President of the Entomological Society of Ontario (Discusses the fertilization of plants by insects). 31st Annual Report Ent. Soc. Ontario, 1900, pp. 29-33.

FYLES, T. W.—The Dragon-flies of the Province of Quebec. 31st Annual Report Ent. Soc. Ontario, 1900, pp. 52-59 (figures).

GIBSON, A.—The breeding of Lepidoptera, with notes on the inflation of larvæ. 31st Annual Report Ent. Soc. Ontario, 1900, pp. 79-81.

GIBSON, A.—Life-history of the greenhouse Leaf-tyer, *Phlyctænia ferrugalis*. Can. Ent., XXXIII, 140-144 (May, 1901).

GIBSON, A.—The life-history of *Arctia virguncula*. Can. Ent., XXXIII, 325-9 (Dec., 1901).

GREGSON, PERCY B.—Habits of the larvæ of Dermestes talpinus. 31st Annual Report Ent. Soc. Ontario. 1900, pp. 84-85 (fig.).

GREGSON, PERCY B.—The principal injurious Insects of the North-west for 1900. 31st Annual Report Ent. Soc. Ontario, 1900, pp. 106-108.

GROTE, A. RADCLIFFE.—Systematic arrangement of the North American Lepidoptera. Can. Ent., XXXIII, 116-118 (April, 1901).

GROTE, A. RADCLIFFE.—Some original descriptions of Guenée (*Leucania insueta*, *Agrotis ochrogaster*, *Catocala micronympha* and *C. Belfragiana*. Can. Ent., XXXIII, 177-9 (June, 1901).

GROTE, A. RADCLIFFE.—On Types of Acronycta. Can. Ent., XXXIII, 242-245 (Sept., 1901).

HANHAM, A. W.—A list of Manitoba Moths, Part V. Can. Ent., XXXIII, 213-220 (Aug., 1901).

HARRINGTON, W. H.—Note on Bæus. Can. Ent., XXXIII, 331-2 (Dec., 1901).

HEATH, E. FIRMSTONE.—Notes on the occurrence of Lepidoptera, etc., in Southern Manitoba. Can. Ent., XXXIII, 98-100 (April, 1901).

HINDS, W. E.—Notes on the life-history of *Alsophila pometaria* (Fall Canker-worm). Can. Ent., XXXIII, 186-191 (July, 1901), plate and figures.

JOHNSON, W. G.—Notes upon the Destructive Green Pea Louse for 1900 (*Nectarophora destructor*). 31st Annual Report Ent. Soc. Ontario, 1900, pp. 99-101.

JOHNSTON, JAMES.—Notes on Insects of the year. 31st Annual Report Ent. Soc. Ontario, 1900, pp. 40-41.

KING, GEORGE B.—Lecanium Websteri, with notes on allied forms. Can. Ent., XXXIII, 106-109 (April, 1901).

KING, GEORGE B.—The Coccidæ of British North America. Can. Ent., XXXIII, 179-180 (June); ib. 193-200 (July); ib. 314-5 (Nov.); ib. 333-6 (Dec., 1901).

LOCHHEAD, W.—Report of the Professor of Biology and Geology, Ontario Agricultural College. Report of the Department of Agriculture for 1900, Toronto, 1901; Vol. I, No. 14, pp. 11-21 (figs.).

LOCHHEAD, W.—Report of the Inspector of Fumigation Appliances, 1900. Annual Report Ontario Department of Agriculture for 1900. Toronto, 1901, Vol. I. No. 18, pp. 15 (plates).

LOCHHEAD, W.—A plea for the systematic and economic study of the Forest Insects of Ontario. 31st Annual Report Ent. Soc. Ontario, 1900, pp. 34-37 (figures).

LOCHHEAD, W.—The Silk-worm Industry in Ontario. 31st Annual Report Ent. Soc. Ontario, 1900, pp. 57-59.

LOCHHEAD, W.—Insects of the Season of 1900. 31st Annual Report Ent. Soc. Ontario, 1900, pp. 72-75 (figs.).

LOCHHEAD, W.—Nature-study lessons on the Squash-bug (*Anasa tristis*). 31st Annual Report Ent. Soc. Ontario, 1900, pp. 75-78 (figures).

Lochhead, W.—The present status of the San José Scale in Ontario. 31st Annual Report Ent. Soc. Ontario, 1900, page 87.

Lochhead, W.—The San José Scale. 32nd Annual Report Ontario Fruit-Growers' Association, 1900, pp. 112-3.

Lochhead, W.—Crude Petroleum Experiments against the San José Scale. Can. Horticulturist, XXIV, 20 (Jan., 1901). The Original Home of the San José Scale; Spraying; ib. 149 (April).

Lochhead, W.—The Buffalo Tree-hopper. More about the San José Scale. Can. Horticulturist, XXIV, 221-3 (June), figs. Some Raspberry Pests, ib. 278-9 (July, 1901), fig.

Lochhead, W.—The Hessian Fly. Bulletin published by the Ontario Department of Agriculture, August, 1901, pp. 16 (figures). Reprinted in "The Sun," Toronto, Aug. 28, 1901.

Lochhead, W.—The New Peach Pest (*Macrodactylus subspinosus*), (in peach orchards at Niagara). Toronto Daily Globe, July 3; Weekly Sun, July 4, 1901.

Lochhead, W.—The Plum Curculio, Guelph Mercury, June, 1901.

Lochhead, W.—Some Useful Friends (Lady-birds, ichneumons, etc.). Guelph Mercury, July 6, 1901.

Lochhead, W.—Ants, Buffalo Carpet-beetles and Clothes-moths. Guelph Mercury, June 27, 1901.

Lochhead, W.—The Hessian Fly again. Farmer's Advocate, XXXVI, 437 (July 1, 1901), figs.

Lyman, Henry H.—Life-history of *Xylina Bethunei.* G. and R. Can. Ent., XXXIII, 1-3 (Jan., 1901).

Lyman, Henry H.—Notes on Walker's types of *Spilosoma congrua* and a few other types in the British Museum. Can. Ent., XXXIII, 94-98 (April, 1901).

Lyman, Henry H.—A New Gortyna (*G. ærata*) and notes on the genus. Can. Ent., XXXIII, 317-320 (Dec., 1901).

MacGillivray, A. D.—Cicadidæ—American genera and species. (Table of genera and bibliography). Can. Ent., XXXIII, 74-84 (March, 1901).

McIntosh, William.—The Hawk and Bombycine Moths of New Brunswick—introductory list. Bull. Nat. Hist. Soc. of New Brunswick, No. XIX, 1901, pp. 301-2.

Moffat, J. Alston.—Notes on the Season of 1900. 31st Annual Report Ent. Soc. Ontario, 1900, pp. 42-44 (figs.).

Moffat, J. Alston.—Parasites in the Eggs of Chrysopa. 31st Annual Report Ent. Soc. Ontario. 1900, pp. 51-52 (figs.).

MOFFAT, J. ALSTON.—*Anosia archippus*, yet again. 31st Annual Report Ent. Soc. Ontario, 1900, pp. 44-51 (fig.).

MORICE, F. D.—The American Bees of the genus Andrena described by F. Smith. Can. Ent., XXXIII, 123-4 (April); ib. 149-155 (May, 1901).

NASH, C. W.—Notes on Danais Archippus. 31st Annual Report Ent. Soc. Ontario, 1900, pp. 86-7.

NEEDHAM, J. G.—The life-history of *Nannothemis bella*, Uhler. Can. Ent., XXXIII, 254-5 (Sept., 1901), figure.

NORRIS, A. E.—Life-history of the Camberwell Beauty Butterfly (*Vanessa antiopa*). Can. Record of Science, VIII, 345-9 (July, 1901).

PALMER, R. M.—Report of the Inspector of Fruit Pests, containing Remedies and Suggestions recommended for adoption by Farmers, Fruit-Growers and Gardeners of the Province. Annual Report of the Provincial Board of Agriculture for 1900, British Columbia Department of Agriculture—pages 243-338 (figures).

PETTIT, MURRAY.—Report of Committee on San José Scale (and discussion thereon). 32nd Annual Report Ontario Fruit-Growers' Association, 1900, pp. 59-64; 93-4.

POLING, OTHO C.—Some recent work in the genus Catocala. (Includes a new species, *C. Frenchii*, from British Columbia). Can. Ent., XXXIII, 125-129 (May, 1901).

REHN, JAMES A. G.—The Linnæan genus Gryllus. Can. Ent., XXXIII, 118-121 April, 1901); ib. 184 (June, 1901).

REHN, JAMES A. G.—Some necessary changes and corrections in names of Orthoptera. Can. Ent., XXXIII, 271-2 (Oct., 1901).

RENNIE, R. W.—Notes on Insects of the year. 31st Annual Report Ent. Soc. Ontario, 1900, p. 41.

SANDERSON, E. DWIGHT.—Some Plant-lice affecting Peas, Clover and Lettuce. Can. Ent., XXXIII, 31-39 (Feb.), figs.; ib. 79-74 (March, 1901), figs.

SCUDDER, SAMUEL H.—*Cyphoderris monstrosa* (description of the female taken at Banff, Alberta). Can. Ent., XXXIII, 17-19 (Jan., 1901).

SCUDDER, SAMUEL H.—My First Namesake. (An account of *Lycæna Scudderii*). Ottawa Naturalist, XV, 121-122 (August, 1901).

SMITH, JOHN B.—Types and Synonymy. (Discusses *Spilosoma congrua*, Walker, and certain species of *Acronycta*). Can. Ent., XXXIII, 146-148 (May, 1901).

SMITH, JOHN B.—Acronycta and Types. Can. Ent., XXXIII, 232-234 (August, 1901).

SMITH, JOHN B.—Concerning protests and other things. (Refers to changes in nomenclature, determination of specimens, etc.). Can. Ent., XXXIII, 276-9 (Oct., 1901).

TURLEY, LOUIS W.—*Cyphoderris monstrosa* (Habits of the Species). Can. Ent., XXXIII, 246-8 (Sept., 1901).

TWEDDLE, JOSEPH.—Report of Committee on Codling Moth Legislature (and discussion thereon). 32nd Annual Report Ontario Fruit-Growers' Association, 1900, pp. 2-7.

WALKER, E. M.—Notes on some Ontario Acridiidæ, Part IV. Can. Ent., XXXIII, 20-23 (Jan., 1901).

WEBSTER, F. M.—Results of some Experiments in protecting Apples from the attack of the Second Brood of Codling Moths. 31st Annual Report Ent. Soc. Ontario, 1900, pp. 37-38 (fig.).

WEBSTER, F. M.—Results of some applications of crude petroleum to Orchard Trees. 31st Annual Report Ent. Soc. Ontario, 1900, pp. 59-61.

WEBSTER, F. M.—Notes on two Longicorn Beetles affecting growing Nursery Stock. (*Saperda vestita* and *Oberea bimaculata*). 31st Annual Report Ent. Soc. Ontario, 1900, pp. 81-84 (figures).

WEBSTER, F. M.—Observations on several species of Dermestidæ. 31st Annual Report Ent. Soc. Ontario, 1900, pp. 85-86.

WEITH, R.—The life-history of *Nannothemis bella*, Ulher. Can. Ent., XXXIII, 252-4 (Sept., 1901).

WICKHAM, H. F.—Two new blind beetles of the genus *Adranes*, from the Pacific Coast. (Describes *A. pacificus* and *Taylori* and gives a table of specific distinctions). Can. Ent., XXXIII, 25-28 (Jan., 1901), figs.

WINN, A. F.—Curious effect of the attack of an Asilus Fly on *Colias philodice*. Can. Ent., XXXIII, 330-1, (Dec., 1901).

XI.— *Bibliography of Canadian Geology and Palæontology for the Year 1901.*

By DR. H. M. AMI.

(Read May 27, 1902.)

ADAMS, F. D.

The Excursion to the Pyrenees in connection with the Eighth International Geological Congress.

Journal of Geology, Vol. 9, pp. 28-46, 3 plates, Jan.-Feb., 1901, Chicago, Ill.

Notes on the Iron Ore Deposits of Bilboa, Northern Spain.

Journ. Can. Min. Instit., Vol. 4, pp. 196-204, 1901, Ottawa.

George M. Dawson.

Science, new series, Vol. 13, pp. 561-563, 1 pl. 1901.

Experimental Work on Flow of Rocks.

Science, new series, Vol. 13, pp. 95-96, 1901.

ADAMS F. D. and NICHOLSON, J. T.

An Experimental Investigation into the Flow of Marble.

Phil. Trans. Roy. Soc., London, Vol. 195, pp. 363-401, pls. 22-25, 1901, London. Reviewed by I. H. O. in Amer. Geol., Vol. 27, No. 5, pp. 316-317, May, 1901.

AMI, H. M.

Synopsis of the Geology of Canada, being a summary of the principal terms employed in Canadian Geological Nomenclature (Read May 29th, 1900).

Trans. Roy. Soc. Can., 2nd series, 1900-1901, Vol. 6, Sect. 4, pp. 187-225, Ottawa, Can. Reviewed in the Ottawa Naturalist, Vol. 15, No. 2, pp. 59-62.

Knoydart Formation of Nova Scotia.

Bull. Geol. Soc. Amer., Vol. 12, pp. 301-312, plate 26 (map), August, 1901, Rochester, N.Y.

On the Geology of the Principal Cities in Eastern Canada. (Read before the Royal Society of Canada, May, 25th, 1899.)

Trans. Roy. Soc. Can., 2nd series, 1900-1901, Vol. 6, Sect. 4, pp. 125-173, March 25th, 1901, Ottawa.

Description of tracks from the fine-grained mudstones of the Knoydart formation (Eo-Devonian) of Antigonish Co., Nova Scotia.

N. S. Inst. Sci., Vol. 10, pp. 330-332, 1901.

Notice of Prof. E. D. Cope's article:—"On Cyphornis, an Extinct Genus of Birds."

Can. Rec. Sci., Vol. 8, No. 5, pp. 331-332, January, 1901, Montreal, Que.

On a New or Hitherto Unrecognized Geological Formation in the Devonian System of Canada.

Can. Rec. Sci., Vol. 8, No. 5, pp. 296-305, January, 1901, Montreal, Que.

Addenda and Corrigendum to "Progress of Geological Work in Canada during 1899."

Can. Rec. Sci., Vol. 8, No. 5, pp. 329-331, January, 1901. Montreal, Que.

Annual Address of the President of the Ottawa Field-Naturalists' Club (giving sketch of life and work of E. Billings, Palæontologist).

Ottawa Naturalist, Vol. 14, No. 11, pp. 197-212, Feb., 1901, Ottawa.

Stratigraphical Note (being note on sub-divisions of Devonian and Silurian of Arisaig, Antigonish County, Nova Scotia).

Science, new series, Vol. 13, No. 323, pp. 394-395, March 8th, 1901, New York.

Review of "General Index to the Reports of Progress, 1863-1884, by D. B. Dowling," Ottawa, 1900, pp. 475.

Science, new series, Vol. 13, No. 324, pp. 424-425, March 15th, 1901, New York. Also in Ottawa Naturalist.

(Researches in Palæontology and Stratigraphy).

Sum. Rep. Geological Survey Dept. for 1900, pp. 178-182, April 15th, 1901, Ottawa. Printed by Order of Parliament.

Brief Biographical Sketch of Elkanah Billings.

The Amer. Geologist, Vol. 27, No. 5, pp. 265-281, May, 1901, Minneapolis, Minn., U.S.A., see also: Amer. Geol., Vol. 28, p. 132, 1901.

The Late George Mercer Dawson (with Portrait).

The Ottawa Naturalist, Vol. 15, No. 2, pp. 43-52, May, 1901.

The Royal Society of Canada. (Twentieth Meeting.)

Science, new series, Vol. 13, No. 339, pp. 1015-1021, June, 28th, 1901. (Contains abstracts of geological papers and notes of discussions thereon.)

Notes on some of the Silurian and Devonian formations of Eastern Canada, and their faunas and floras.

Abstract, Science, new ser., Vol. 13, pp. 1017-1018, 1901.

On the subdivisions of the Cambrian system in Canada.

Abstract, Science, new ser., Vol. 13, p. 1019, 1901.

A dual classification required in the nomenclature of the geological formations in different systems in Canada.

Abstract, Science, new ser., Vol. 13, pp. 1019-1020, 1901.

Review of "A Chapter on the Pleistocene Geology of Northern Asia, by Dr. G. Frederick Wright."

The Ottawa Naturalist, Vol. 15, No. 7, pp. 172-173, October, 1901, Ottawa.

Review and Notice of Dr. A. Smith Woodward's paper entitled "On a new Ostracoderm (Euphanerops longævus) from the Upper Devonian of Scaumenac Bay, Province of Quebec, Canada."

The Ottawa Naturalist, Vol. 15, No. 7, p. 174 (3-4 p.), October, 1901, Ottawa.

Bibliography of Sir John William Dawson.

Trans. Roy. Soc. Can., 2nd series, 1901-1902, Vol. VII. Sect. 4. pp. 15-44, issued Nov. 26th, 1901, Ottawa.

Bibliography of Dr. George Mercer Dawson.

The Ottawa Naturalist, Vol. 15th, No. 9, pp. 201-213, December, 1901, Ottawa; see also: Amer. Geol., Vol. 28, pp. 76-86, 1901.

Preliminary lists of the organic remains occurring in the various geological formations comprised in the map of the Ottawa district, including portions of the provinces of Quebec and Ontario, along the Ottawa River.

(Separate) Rep. Ann. Rep. Geol. Surv. Can., new series, Vol. XII, pp. 51G-77G, December, 1901. Ottawa.

(Notice of paper read before the Geological Society of America, Albany meeting, Dec., 1900, by J. F. Kemp), "The Knoydart Formation in Nova Scotia, a bit of the 'Old Red Sandstone' of Europe."

Science, new series, Vol. 13, No. 317, p. 315, 1901, New York city.

BAILEY, L .W.

Summary Report of Geological Investigations in New Brunswick.

Sum. Rep. Geol. Surv. Dept. for 1900, pp. 146-151, Queen's Printer, Ottawa, 1901. Printed by order of Parliament.

On some modes of occurrence of the Mineral Albertite.

Abstract, Science, new ser., Vol. 13, p. 1018, 1901.

On some geological correlations in New Brunswick.

Abstract, Science, new ser., Vol. 13, pp. 1018-1019, 1901.

BARLOW, A. E.

(Summary Report of work in the Muskoka, Haliburton and Dungannon Districts of Ontario.)

Sum. Rep. Geol. Surv. Dept. for 1900, pp. 127-129, April 15th, 1901, Ottawa. Queen's Printer, Printed by order of Parliament.

BELL, J. M.

(Explorations in the Great Bear and Great Slave Lake Districts.)

Sum. Rep. Geol. Surv. Dept. for 1901, pp. 95-103, April 15th, 1901. Printed by order of Parliament.

BELL, ROBERT.

(On the Geology of Michipicoten district, Ontario.)

Sum. Rep. Geol. Surv. Dept. for 1901, pp. 110-121, April 15th. 1901, Ottawa. Printed by order of Parliament.

Summary Report of Geological Investigations in the Michipicoten Mining Districts of Ontaria.

Sum. Rep. Geol. Surv. Dept. for 1900, Queen's Printer, Ottawa, 1900. Printed by order of Parliament.

(One of Canada's Explorers), by Charles Hallock.

Extracted from Forest and Stream, Vol. 53, No. 4, pp. 63, July 22, 1899, and reprinted as separate under cover with portrait, as a private publication, Washington, D.C., Feb., 1901.

On an Exploration on the Northern Side of Hudson Strait.

Geol. Surv. Can. Ann. Rep. new series. Vol. 21, Report M, 38 pp., 1901. July 13th, 1901, with whole volume, Ottawa.

Laurentian limestones of Baffinland.

Abstract, Science, new ser., Vol. 13. p. 100, 1901.

BLAKEMORE, W.

Pioneer Work in the Crows Nest Coal Areas.

Journal Can. Min. Instit., Vol. 4, pp. 240-243, 1901, Ottawa.

BREWER, W. M.

Texada Island, British Columbia.

Eng. and Mg. Jour., Vol. 72, pp. 665-667, 2 figs., 1901.

BROCK, R. W.

(On the Geology of the Area covered by the West Kootenay Map-Sheet.)

Summary Report of the Geological Survey Department for 1900, pp. 62-84, April 15th, 1901, Ottawa. Printed by order of Parliament.

BUCHAN, J. S.

Was Mount Royal an Active Volcano?

Can. Rec. Sci., Vol. 8, No. 5. pp. 321-328, January, 1901, Montreal, Que. (Reviewed in May, 1901, No. of Amer. Geol., by J. A. Dresser.)

CHALMERS, ROBERT.

(Surface Geology of North-Western New Brunswick.)

Summary Report of the Geological Survey Department for 1900, pp. 151-161, April 15th, 1901, Ottawa. Printed by order of Parliament.

The Sources and Distribution of the Gold-Bearing Alluvions of Quebec (with one illustration).

The Ottawa Naturalist, Vol. 15, No. 2, pp. 33-36, May, 1901, Ottawa.

Note on the Pleistocene Marine Shore-lines and Landslides of the North Side of the St. Lawrence Valley, pp. 63 J-70J (illustrated). Appendix I. to "Report on the Geology of the Three Rivers Map-Sheet or North-Western Sheet of the Eastern Townships Map of Quebec," by Dr. R. W. Ells.

Report J (No. 707), Geol. Surv. Can. Ann. Rep., Vol. XI, new series, issued July 13th, 1901, Ottawa.

COLE, GRENVILLE A. J.

On Bellnurus Kiltorkensis, Baily.

Geological Magazine, No. 440, new series, Dec. 4th, Vol. 8, No. 2, pp. 52-54, February, 1901, London, Eng. (Reply to R. W. E., of Ottawa Naturalist for January, 1900, on a Nova Scotian Species of Belinurus.)

COLEMAN, A. P.

Marine and Freshwater Beaches of Ontario.

Bulletin of Geological Society of America, Vol. 12, pp. 129-146, March, 1901, Rochester, N.Y. (Map.)

Glacial and Inter-Glacial Beds near Toronto.

Journal of Geology, Vol. 9, No. 4, May-June, 1901, pp. 285-310. (Illustrated.)

The Vermilion River placers (Ontario).

Ont. Bureau of Mines Rep. for 1901, pp. 151-159, 1901. Toronto.

Iron ranges of the Lower Huronian (Ontario).

Ont. Bureau of Mines Rep. for 1901, pp. 181-211, pl. 25-28, 1901.

Sea beaches of Eastern Ontario.

Ont. Bureau of Mines Rep. for 1901, pp. 215-227, pl. 29-30, 1901.

CONNOR, M. FRANK, and DRESSER, JOHN A.

On the Petrography of Shefford Mountain. (Chemical analyses of rocks, by M. F. C.).

American Geologist, Vol. 28, No. 4, pp. 203-213, October, 1901, Minneapolis, Minn.

CORLESS, C. V.

The Coal Creek Colliery of the Crows Nest Pass Coal Company.
Journ. Can. Min. Institute, Vol. IV, pp. 154-173, 1901, Ottawa.

CURRIE, P. W.

On the Ancient Drainage at Niagara Falls. (Read before the Canadian Institute, March 9th, 1901.)
Transactions Canadian Institute, Vol. 7, No. 13, Part 1, pp. 8-14, August, 1901, Toronto. (Illustrated.)

DALY, REGINALD A.

The Physiography of Acadia.
Bull. Mus. Comp. Geology at Harvard Col., Vol. 38, Geol. series, Vol. 5, No. 3, pp. 71-104, eleven plates, March, 1901, Cambridge, Mass. (Reviewed in Amer. Geol., Vol. 27, No. 5, pp. 317-318.)
(Paper on Concretions of Kettle Point, Lambton Co., Ontario, reviewed by W. O. Crosby in Amer. Geol., Vol. 27, p. 253, 1901).
Notes on oceanography.
Science, new ser., Vol. 13, pp. 951-954, 1901.

DAVIS, W. M.

Abstract of paper by Prof. Ganong on the physiography of New Brunswick.
Science, new ser., Vol. 13, pp. 471-472, 1901.
Current notes on physiography—Character of the plain of the St. Lawrence Valley.
Science, new ser., Vol. 13, pp. 698-699, 1901.
Review of report by A. P. Low on South Shore of Hudson Strait.
Science, new ser., Vol. 14, p. 779, 1901.
Review of Dowling and Tyrrell's report on Lake Winnipeg.
Science, new ser., Vol. 14, pp. 856-859, 1901.

DAWSON, GEORGE MERCER.

Summary Report of the Geological Survey Department.
(Annual Summary Report of the Geological Survey Department for the year ending December 31st, 1900), pp. 1-37, April 15th, 1901. Ottawa. Printed by order of Parliament. (Posthumous.)
Geological record of the Rocky Mountain region in Canada.
Geol. Soc. Am. Bull., Vol. 12, pp. 57-92, 1901.
Physical History of the Rocky Mountain Region in Canada.
Science, new series, Vol. 13, No. 324, pp. 401-407, March 15th, 1901. (Concluding section of the address of the President of the Geological Society of America, the late Dr. G. M. Dawson, read before the Society, Dec. 19th, 1900.)
Geological Survey of Canada, Annual Report, new series, Vol. XI, parts A, D, F, G, I, L, M, R and S, 856 pages of reports besides an index of 30 pp., numerous plates and four folded maps in separate cover, July 13th, 1901. Reviewed by W. U. (Warren Upham) in Amer. Geol., Vol. 28, No. 5, pp. 321-322, Nov., 1901.

DONALD, J. T.

The Composition of some Canadian limestones.
Can. Mining Review, Vol. 20, pp. 67-68, 1901.
Can. Mining Inst. Jour., Vol. 4, pp. 152-154, 1901.

DOOLITTLE, DR. P. E.

Mining Development in the Kootenays, British Columbia.
Mining and Metallurgy, Vol. 24, No. 2, pp. 33-34 (illustrated by three half-tone cuts). Los Angeles, New York and Chicago.

DOWLING, D. B.

On the Geology of the West Shore and Islands of Lake Winnipeg.
Geol. Surv. Can. Ann. Rep., new series, Vol. XI, Report F, 93 pp (July 13th, 1901, whole volume). Illustrated. Ottawa.
(See) J. B. Tyrrell's Rep. Geol. East Shore of Lake Winnipeg.
The Physical Geography of the Red River Valley.
The Ottawa Naturalist, Vol. 15, No. 5, pp. 115-120, August, 1901, Ottawa, Canada. Separate.

DRESSER, JOHN A.

A. hornblende Lamprophyre dyke at Richmond, P.Q.
Can. Rec. Sci., Vol. 8, No. 5, pp. 315-320, January, 1901, Montreal.
Preliminary Note on the Amygdolerdal trap rock in the Eastern Townships of the Province of Quebec.
Ottawa Naturalist, Vol. 14, pp. 180-182, January, 1901, Ottawa.
On the Petrography of Mount Orford.
American Geologist, Vol. 27, No. 1, pp. 14-21, January, 1901, Minneapolis, Minn.
(Geology of Shefford Mountain, Province of Quebec) Summary Report.
Geol. Surv. Dept. for 1900, pp. 141-143, April 15th, 1901, Ottawa. Printed by order of Parliament.
Review of paper by J. S. Buchan: "Was Mount Royal an Active Volcano?"
Can. Rec. Sc., Vol. 8, No. 5, pp. 321-328, 1901.
In Amer. Geol., Vol. 29, May, 1901.

DRESSER, JOHN A., and CONNOR, M. F.

On the Petrography of Shefford Mountain.
American Geologist, Vol. 27, No. 4, pp. 203-213, October, 1901, Minneapolis, Minn.

ELLS, R. W.

(On the Geology of Portion of the Ottawa Valley.)
Summary Report of the Geological Survey Department for 1900, pp. 129-139, April 15th, 1901, Ottawa. Printed by order of Parliament.
The Physical Features and Geology of the Palæozoic basin between the Lower Ottawa and St. Lawrence Rivers.
Trans. Royal Soc. Can., 2nd series, 1900-1901, Vol. 6, Sect. 4. pp. 99-120, Ottawa. Also as separate, issued March 25th, 1901.
Ancient Channels of the Ottawa River (with Map).
The Ottawa Naturalist, Vol. 15, No. 1, pp. 17-30, April, 1901, Ottawa.
The Devonian of the Acadian Provinces.
Can. Rec. Sci., Vol. 8, No. 6, pp. 335-343, July, 1901, Montreal.
Report on the Geology of the Three Rivers Map-Sheet or Northwestern Sheet of the Eastern Townships Map, Quebec.
Geol. Surv. Can. Ann. Rep., new series, Vol. 11, Report J (pp. 53). July 13th, 1901 (whole volume), Ottawa.

The Carboniferous Basin in New Brunswick.
Trans. Royal Soc. Canada, 2nd series, Vol. 7, Sect. 4. pp. 45-56, issued October, 1901, Ottawa.

FARIBAULT, E. R.

(Geology of Gold-Mining Districts of Nova Scotia.)
Summary Report of the Geological Survey Department for 1900, p. 167, April 15th, 1901, Ottawa. Printed by order of Parliament.

FLETCHER, HUGH.

(Geology of the Springhill and Inverness Coal Fields of Nova Scotia.)
Summary Report of the Geological Survey Department for 1900, pp. 162-166, April 15th, 1901, Ottawa. Printed by order of Parliament.

FOORD, A. H.

Review of "Geological Survey of Canada" Reports by J. McEvoy, J. F. Whiteaves, and D. B. Dowling.
Geol. Mag., Vol. 8, No. 3, pp. 136-139, March, 1901 (new series, Dec. 4), London, Eng.

GILBERT, G. K.

Physical History of Niagara River.
Abstract, Amer. Geol., Vol. 27, pp. 375-377, 1901.

GILPIN, EDWIN (JR.).

The Minerals of Nova Scotia.
78 pp., Halifax, N.S.

GRABAU, A. W.

Guide to the geology and palæontology of Niagara Falls and vicinity.
Buffalo Soc. Na. Sci., Bull., Vol. 7, pp. 1-284, 18 pl. 190 fig. and map. 1901.
N. Y. State Museum Bull., No. 45, pp. 1-284, 18 pl., 190 figs and map, 1901.
Reviewed: Am. Geol., Vol. 28, pp. 56-57, 1901.
Recent contributions to the problem of Niagara.
Abstract, Science, new ser., Vol. 14, p. 773, 1901.
N. Y. Acad. Science Annals, Vol. 14, p. 139, 1901.
Am. Geol., Vol. 28, pp. 329-330, 1901.

GRANT, C. C., and NEILL, A. G.

Annual Report of the Geological Section of the Hamilton Scientific Association for the term ending May 9th, 1901.
Journal & Proceedings Hamilton Scientific Association, Session 1900-1901, No. 17, pp. 59-61. 1901, Hamilton.

GRANT, C. C.

Opening Address, Geological Section, pp. 62-73, with supplementary article "Notes on a few fossils," pp. 74-75.
Journ. & Proc. Hamilton Scientific Association, Session 1900-1901, No. 17, pp. 62-75, 1901, Hamilton, Ont.
Niagara Falls as an Index of Time.
Journ. & Proc. Hamilton Scientific Association, Session 1900-1901, No. 17, pp. 78-83 (Fig. 3), 1901, Hamilton, Ont.

(Read before the Hamilton Scientific Association. March 25th, 1901.)
Journ. & Proc. Hamilton Scientific Association, Session 1900-1901. No. 17, pp. 84-90, 1901 (Illustrated with one plate), Hamilton, Ont.
Geological Notes, etc.
(Read before the Hamilton Scientific Association, Session 1900-1901. No. 17, pp. 91-96, 1901, Hamilton, Ont.

Gregory, J. W.
The Plan of the Earth and Its Causes.
Amer. Geol., Vol. 27, No. 2, pp. 100-119, also No. 3, pp. 134-147, March 1901, Minneapolis, Minn. (See p. 141 re Canadian Schield.)

Gwillim, J. C.
(Report on the Mining Operations of the Atlin District of British Columbia.)
Summary Report of the Geological Survey Department for 1900, pp. 52-62, April 15th, 1901, Ottawa. Printed by order of Parliament.

Hallock, Charles.
One of Canada's Explorers (Dr. R. Bell).
Reprinted from Forest and Stream, Vol. 53, No. 4, pp. 63, July 22, 1899, as a separate paper, Feb., 1901, 15 pp., Washington, D.C.

Harrington, B. J.
George Mercer Dawson.
Am. Geol., Vol. 28, pp. 67-76, plate 9, 1901.

Haycock, Ernest.
Records of Post Triassic Changes in King's County, Nova Scotia.
Trans. Nova Scotian Institute of Science, Vol. 10. Session 1899-1900, pp. 287-302, illustrated, Halifax, N.S.

Hitchcock,, C. H.
The Story of Niagara.
The American Antiquarian, January, 1901. Separate, 24 pp., illustrated. (Canada side also discussed.)

Hoffmann, G. C.
New Mineral Occurrences in Canada.
Amer. Journ. Sci., Vol. 11, p. 149, Feb., 1901, New Haven.
(Researches in Chemistry and Mineralogy.)
Summary Report of the Geol. Survey Dept. for 1900, pp. 167-175, April 15th, 1901, Ottawa. Printed by order of Parliament.
Summary of Work of Chemical and Mineralogical branch of the Geological Survey of Canada for 1900.
Sum. Rep. Geol. Surv. Dept. for 1900, Queen's Printer, Ottawa. Printed by order of Parliament.

Hoffmann, G. C., with Johnston, R. A. A., and Wait, F. G.
Section of Chemistry and Mineralogy.
Geol. Surv. Can. Ann. Rep., new series, Vol. 11 (Report R), 55 pp. (whole volume July 13, 1901), Ottawa.

Hopkins, A. D.
Work of the Prehistoric Scolytid Phlæosinus squalideus, Scudder.
Appendix Canad. Foss. Insects, 4. Contrib. to Canad. Pal., Vol. 2, Part 2, Geol. Surv. Can. 1901, Ottawa (No. 710).

HOVEY, E. O.

"The Geological Society of America," Thirteenth Annual Meeting, Albany, December 27-29, 1900.

Scientific American Supplement, No. 1307, pp. 20948-9-50, January, 19th, 1901, New York City. (Canadian papers noticed.)

INGALL, Æ. D.

(Report of the Division of Mines and Mineral Statistics).

Summary Report of the Geological Survey Department for 1900, p. 176, April 15th, 1901, Ottawa. Printed by order of Parliament.

Section of Mineral Statistics and Mines.

Geol. Surv. Can. Ann. Rep., new series, Vol. XI, 181 pp. Report S (July 13th, 1901, in whole volume), Ottawa, Ont. Separate issued.

Report on the Iron Ore Deposits along the Kingston and Pembroke Railway in Eastern Ontario.

Geol. Surv. Can. Ann. Rep., Part 1, Vol. XII, Sect. Mines and Mineral Statistics, 91 pp., Ottawa.

JOHNSTON, R. A. A., with G. C. HOFFMANN and F. C. WAIT.

(Section of Chemistry and Mineralogy).

Geol. Surv. Can. Ann. Rep., new series, Vol. XI, Report R, 55 pp. (July 13th, 1901), Ottawa.

LAFLAMME, J. C. K.

Modifications remarquables causées a l'embouchure de la Rivière Ste. Anne par l'éboulement de St-Alban.

Can. Roy. Soc., Proc. and Trans., new ser., Vol. 6, sec. 4, pp. 175-177, 1900.

Eboulement à Saint-Luc-de-Vincennes, Rivière Champlain le 21 septembre, 1895.

Can. Roy. Soc., Proc. and Trans., new ser., Vol. 6, sec. 4, pp. 179-186, 1 fig., 1900.

LAMBE, L. M.

Notes on a Turtle from the Cretaceous of Alberta.

The Ottawa Naturalist, Vol. 15, No. 3, pp. 63-67. Plates III-VI, inclusive, June 1901, Ottawa.

A Revision of the Genera and Species of Canadian Palæozoic Corals, the Madreporia Aporosa and the Madreporia Rugosa.

Geol. Surv. Can. Contributions to Canadian Palæontology, Vol. 4. Part 2, pp. 93-197, Plates VI-XVIII, Ottawa. (Issued May 6, 1901.)

(Zoological and Palæontological Researches).

Sum. Rep. Geol. Surv. Dept. for 1900, pp. 182-183, April 15th, 1901, Ottawa. Printed by order of Parliament.

Summary Report of Work done in Palæontology and Zoology in the Geological Survey of Canada for 1900.

Sum. Rep. Geol. Surv. Dept. for 1900, Ottawa, 1901. Printed by order of Parliament.

LE ROY, OSMOND EDGAR,

Geology of Rigaud Mountain, Canada.

Bull. Geol. Soc. Amer., Vol. 12, pp. 377-394, Plates 33-34. Sept., 1901, Rochester. (Illustrated.)

(Geology of Part of the Island of Montreal.)
Sum. Rep. Geol. Surv. Dept. for 1900, pp. 139-141. April 15th. 1901, Ottawa. Printed by order of Parliament.

(Le Roy, O. E.)

Notice of paper read before Geological Society America, at Albany meeting, Dec., 1900, by J. F. Kemp, on the "Geology of Rigaud Mountain, Province of Quebec, Canada."
Science, new series, Vol. 13, No. 317, pp. 136-137, January, 1901.

Low, A. P.

On an Exploration of a Part of the South Shore of Hudson Strait and Ungava Bay.
Geol. Surv. Can. Ann. Rep., new series, Vol. XI, Report L, pp. 45, 1901, (July 13th, 1901, whole volume issued.) Illustrated. Ottawa. Printed by order of Parliament.

Matthew, G. F.

Preliminary notice of the Etcheminian fauna of Newfoundland.
N. B. Nat. Hist. Soc. Bull., Vol. 4, pp. 189-196, 3 plates, 1899.
Preliminary notice of the Etcheminian fauna of Cape Breton.
N. B. Nat. Hist. Soc. Bull., Vol. 4, pp. 198-208, 4 plates, 1899.
Abstracts, Am. Jour. Sci., 4th series, Vol. 11, p. 396, 1901.
Am. Geol., Vol. 27, p. 49, 1901.
New Species of Canadian Fossils of Cape Breton.
Bull. Nat. Hist. Soc. New Brunswick, Vol. XIX, pp. 269, 1901.
Are the St. John Beds Carboniferous?
Amer Geol., Vol. 27, pp. 383-386, June, 1901, Minneapolis, Minn.
Review of "Beitrage zur Kenntniss des Siberischen Cambrium I. von Eduard von Toll in Mem. Imp. Acad. Sci., St. Petersburg, ser. 8, Vol. 8, No. 10."
Amer. Geol., Vol. 27, No. 1, pp. 54-56, Jan., 1901, Minneapolis, Minn.
Table of Geology of St. John City, included in Geology of Principal Cities in Eastern Canada, by H. M. Ami.
Trans. Roy. Soc. Can., Vol. 6, Sect. IV, 1900-1901.
(Palæontological Surveys in Cape Breton).
Sum. Rep. Geol. Surv. Can. for 1900, pp. 183-184, April 15th, 1901. Ottawa. Printed by order of Parliament.
Acrothyra and Hyolithes—A Comparison.
Can. Roy. Soc., Proc. and Trans., Vol. 7, sec. 4, pp. 93-106.
Abstract, Science, new ser., Vol. 13, p. 1018, 1901.
Hyolithes gracilis and related forms from the Lower Cambrian of the St. John Group.
Can. Roy. Soc., Proc. and Trans., Vol. 7, sec. 4, pp. 109-111, 1901.
Les plus anciennes faunes paléozoïques.
Int. Cong. Geol., Compte Rendu viii, session, pp. 313-316, 1901.
A backward step in Palæobotany.
Abstract of paper read before Roy. Soc. of Can., Science, new ser., Vol. 13, p. 1019, 1901.
(Correspondence.)
Can. Rec. Science, Vol. VIII, No. 6, pp. 344-345, July, 1901, Montreal, Que.

Review of "Essai d'une monographie des dépots marins et cartimentaux du quarternaire moseen, le plus ancien de la Belgique," par Michel Mourlon (Edr. Ann. Soc. Geol. Belgique), T. 25, 1900, p. 121.
Can. Rec. Sci., Vol. 8, No. 6, p. 411, July, 1901, Montreal, Que.

Summary Report of a Palæontological Survey in the Cambrian of Cape Breton, Nova Scotia.
Sum. Rep. Geol. Surv. Dept. for 1900, Ottawa. Printed by order of Parliament.

MILLER, W. G.

On Some Newly Discovered Areas of Nepheline Syenite in Central Canada.
Amer. Geol., Vol. 27, No. 1, pp. 21-25, Minneapolis, Minn.

Iron ores of Nipissing district (Ontario).
Ont. Bureau of Mines Rep. for 1901, pp. 160-180, 2 plates, 2 fig., 1901.

The iron ore fields of Ontario.
Can. Mg. Rev., Vol. 20, pp. 151-158, 3 figs., 1901.
Can. Mg. Inst. Jour., Vol. 4, pp. 265-283, 3 figs., 1901.

MCCONNELL, R. G.

(Observations in the Klondyke Region.)
Sum. Rep. Geol. Surv. Dept. for 1900, pp. 38-52, 1901, Ottawa. Printed by order of Parliament.

MCEVOY, JAMES.

(Geological Examination of the Crows Nest pass Coal Fields).
Sum. Rep. Geol. Surv. Dept. for 1900, pp. 85-95, April 15th, 1901. Ottawa. Printed by order of Parliament.

Report on the Geology and Mineral Resources of the Country traversed by the Yellowhead Pass Route from Edmonton to Tête Jaune Cache, comprising portions of Alberta and British Columbia.
Geol.. Surv. Can. Ann. Rep. (No. 703), Part D, Vol. XI, pp. 44, with map, 1901, Ottawa. Printed by order of Parliament.

MCGEE, W. J.

George Mercer Dawson (with Portrait).
American Anthropologist, new series, Vol. 3, No. 11, pp. 159-163, 1901, Washington.

MCINNES, WILLIAM.

(On the Geology of the district southwest of Port Arthur, Ontario.)
Sum. Rep. Geol. Surv. Dept. for 1900, pp. 104-109, April 15th, 1901, Ottawa. Printed by order of Parliament.

Summary Report of the Geological Investigations in the Gold-Mining districts of North-Western Ontario.
Summary Rep. Geol. Surv. Dept. for 1900, Ottawa, 1901. Printed by order of Parliament.

NEILL, A. T., and C. C. GRANT.

Annual Report of the Geological Section of the Hamilton Scientific Association for the term ending May 9th, 1901.
Journ. & Proc. Hamilton Sc. Association, Session 1900-1901, No. XVII, pp. 59-61, 1901, Hamilton.

NICHOLSON, J. T. and ADAMS, F. D.

An experimental investigation into the flow of marble.

(See Adams, F. D. and Nicholson, J. T.).

OBALSKI, J.

Note on the Magnetic Iron Sand of the North Shore of the St. Lawrence.

Journ. Can. Min. Instit., Vol. IV, pp. 91-98, 1901, Ottawa.

PARKINSON, J.

Some Lake Basins in Alberta and British Columbia.

Geol. Mag., No. 441, new series, Dec. 4, Vol. 8, No. 3, pp. 97-101, plate VI, March, 1901, London, Eng.

PARKS, WILLIAM A.

(Geology of the Muskoka Map-Sheet of the Ontario Series.)

Sum. Rep. Geol. Surv. Dept. for 1900, pp. 122-127, April 15th, Ottawa. Printed by order of Parliament.

PENHALLOW, D. P.

Notes on the North American Species of Dadoxylon, with especial reference to type material in the collection of the Peter Redpath Museum of McGill University.

Trans. Royal Soc. Can., 2nd series, Vol. 6, Sect. 4, pp. 51-97, 1901, Ottawa.

Review of "Studies in Fossil Botany," by Dunkenfield Henry Scott, 533 pp. Illustrated. London, 1901.

Science, new series, Vol. 13, No. 323, pp. 386-389, March, 8th, 1901, London.

A Decade of North American Palæontology, 1890-1900. Address of the President of the Society of Plant Morphology and Physiology, given before the Baltimore meeting, December, 1900.

Science, new series, Vol. 13, No. 318, pp. 161-176, 1901, London.

Review of "the Mesozoic flora of the United States."

Science, new ser., Vol. 13, pp. 904-906, 1901.

ROBERTSON, W. F.

Mineral Production of British Columbia.

Report of the Minister of Mines, L, Edward VII, pp. 701-1027, for the year ending December 31st, 1900.

SCHUCHERT, CHARLES.

On the Helderbergian Fossils near Montreal, Canada.

Amer. Geol., Vol. 27, No. 4, pp. 245-253, April, 1901, Minneapolis, Minn.

SCUDDER, S. H.

4. Additions to Coleopterous fauna of the Interglacial clays of the Toronto district, with an appendix by A. D. Hopkins on the Scolytid borings from the same deposits.

Geological Survey of Canada, Contributions to Canadian Palæontology, Vol. 2, Canadian Fossil insects, pp. 63-92, No. 710, May 6th, 1901, Ottawa.

SMITH, L. H.

The Extinction of the Elk in Ontario.

The Ottawa Naturalist, Vol. 15, No. 5, pp. 95-97 (figure), July, 1901, Ottawa.

SNELL, RENDALL.

Mines and Mining in Eastern Ontario.

Mining Journal, Toronto, Murray Printing Co., Globe Building, 1901, 48 pp. Illustrated.

TAYLOR, F. B.

Glacial phenomena in Eastern Ontario.

Abstract, Science, new ser., Vol. 13, p. 138, 1901.

TYRRELL, J. B.

Report on the East Shore of Lake Winnipeg and the adjacent parts of Manitoba and Keewatin (compiled by D. B. Dowling from notes by J. B. T.).

Geol. Surv. Can. Ann. Rep. for 1900, new series, Vol. XI, 89 pp. Illustrated. 1901, Ottawa.

UPHAM, WARREN.

Preglacial erosion in the course of the Niagara gorge and its relation to estimates of Post Glacial times.

Amer. Geol., Vol. 28, No. 4, pp. 235-244, October, 1901, Minneapolis, Minn.

The Toronto and Scarboro Drift Series.

Amer. Geol., Vol. 28, No. 5, pp. 306-316, November, 1901, Minneapolis, Minn.

Review of Geol. Surv. of Can. Annual Rep., new ser., Vol. XI, 1898. Am. Geol., Vol. 28, pp. 321-322.

VAUX, G. and W. S., Jr.

Observations made in 1900 on glaciers in British Columbia.

Phil. Acad. Sci., Proc. for 1901, pp. 213-215.

WAIT, F. G., with G. C. HOFFMANN, and R. A. A. JOHNSTON.

Section of Chemistry and Mineralogy.

Geol. Surv. Can. Ann. Rep., new series, Vol. XI, Report R. 55 pp., 1901, Ottawa.

WALCOTT, C. D.

Cambrian Brachiopoda; Obolella subgenus Glyptias, Bicia, Obolus, subgenus Westonia, with descriptions of New Species.

Smithsonian Institute, new series, Nat. Mus. Proc., Vol. 23, pp. 669-695 (No. 1229), 1901, Washington, D.C.

WALKER, B. E.

List of the Published Writings of Elkanah Billings, F.G.S. Palæontologist to the Geological Survey of Canada, 1856-1876.

Can. Rec. Sci., Vol. VIII, No. 6, pp. 366-388, July, 1901, Montreal.

WATSON, LAWRENCE W.

At Rocky Point.

The Prince Edward Island Magazine (Double number), Vol. 3, Nos. 9 & 10, pp. 318-323, November and December, 1901, Charlottetown, P.E.I.

WILLIS, BAILEY.

Oil of the Northern Rocky Mountains.

Eng. and Mining Jour., Vol. 72, pp. 782-784, 3 figs., 1901.

WILLMOTT, A. B.

The Michipicoten Huronian Area.

Amer. Geol., Vol. 28, p. 14, July, 1901, Minneapolis, Minn.

WILSON, ALFRED W. G.

Physical Geology of Central Ontario (Read before the Canadian Institute, April 20th, 1901).

Trans. Can. Instit., No. 13, Vol. VII, Part I, pp. 139-186, August, 1901, Toronto. (Illustrated.)

WHITE, DAVID.

Some Palæobotanical Aspects of the Upper Palæozoic in Nova Scotia.

Can. Rec. Sci., Vol. VIII, No. 5, pp. 271-280, Jan., 1901, Montreal. Separate, issued 1900.

The Canadian Species of the Genus Whittleseya and their systematic relations.

The Ottawa Naturalist, Vol. 15, No. 4, pp. 98-110, July, 1901, Ottawa.

WHITEAVES, J. F.

(Researches in Palæontology and Zoology.)

Sum. Rep. Geol. Surv. Can. for 1900, pp. 176-178, April 15th, 1901, Ottawa. Printed by order of Parliament.

Note on a Supposed New Species of Lytoceras from the Cretaceous rocks of Denman Island in the Strait of Georgia.

The Ottawa Naturalist, Vol .15, No. 2, pp. 31-32, May, 1901, Ottawa.

Description of a new species of Unio from the Cretaceous rocks of the Nanaimo Coal-Field, V. I.

The Ottawa Naturalist, Vol. 14, No. 10, pp. 177-179, Jan., 1901, Ottawa.

Catalogue of the Marine Invertebrata of Eastern Canada.

Geol. Surv. Can., No. 772, 271 pp., Ottawa.

YOUNG, G. A.

(Geology of Lake St. John Map-Sheet, Province of Quebec.)

Sum. Rep. Geol. Surv. Can. for 1900, pp. 143-146, April 15th, 1901, Ottawa. Printed by order of Parliament.

XII.—*George Mercer Dawson.*

By B. J. HARRINGTON.

(Read May 26, 1902.)

Twenty years have elapsed since the inauguration of the Royal Society of Canada, and in that time many of those who were wont to gather with us have been called to the majority. Sir William Dawson, our first President, died in 1899, ripe in knowledge and in years, but no one then thought that he would so soon be followed by his distinguished son, Dr. G. M. Dawson. To the latter, years of usefulness and honour seemed to remain; but how little do we know of what lies before us! Life is ever uncertain, and Dr. Dawson realized this when he wrote:

"Life is a bubble on the sea,
The ocean of eternity;
It floats awhile in glittering pride,
It may o'er many billows ride.
There comes a moment, none knows why,
No cloud o'erspreads the summer sky,
Some little breath, some hidden thing,
Perhaps a spirit on the wing,
Touches the orb — it melts away,
The sea receives its little spray; —
No mark, no memory left behind.
The everlasting sea, the wind — flow on."

Dr. Dawson was the second son of the late Sir J. W. Dawson, and was born on the 1st of August, 1849, in Pictou, Nova Scotia. In 1855 his father, who had for some years been acting as Superintendent of Education for Nova Scotia, received the appointment of Principal of McGill University, Montreal, and with his family took up his residence there. Instead of the magnificent structures of to-day, there were then on the college grounds only two "unfinished and partly ruinous buildings, standing amid a wilderness of excavators' and masons' rubbish, overgrown with weeds and bushes. The grounds were unfenced and pastured at will by herds of cattle, which not only cropped the grass, but browsed on the shrubs, leaving unhurt only one great elm, which still stands as the 'founder's tree,' and a few old oaks and butternut trees"[1]. Surroundings of this kind were not ideal from a university point of view, but made an instructive environment for an intelligent boy. The numerous wild flowers, the birds' nests, the fossil shells in the blue clay, the waste waterway, where leaves and twigs became "petrifactions," the lively brook where mimic fleets could be navigated and dams constructed—these and many other objects of interest were there, and with the guidance and encouragement of an ever-ready father, the boy's inborn love of nature was daily stimulated and increased.

---

[1] Fifty Years of Work in Canada — Autobiographical Notes by Sir William Dawson, p. 98.

At ten years of age Dawson entered the Montreal High School, remaining there for one year and taking a high place in his classes. Subsequently, however, owing to ill-health, his education was carried on for the most part under tutors; and while this system, no doubt, cut him off from some advantages, it gave him on the other hand wider opportunities for pursuing and mastering subjects which had special attractions for him. Surrounded by books, chemical apparatus, paints and pencils, the days were never too long, and photography, book-binding, painting magic lantern slides, and even cheese-making, afforded him fascinating occupation and amusement. One who knew him well at that time says: "He seemed to absorb knowledge rather than to study, and every new fact or idea acquired was at once put into its place and proper relations in his orderly mind. He was always cheerful, amusing and popular, other boys flocking around him and invariably submitting to his unconscious leadership."

At the age of eighteen, Dawson entered McGill College as a partial student, attending lectures on English, Chemistry, Geology, &c., during the session of 1868-9. The summer of 1869 was spent at Gaspé and much time devoted to dredging for foraminifera, which with material from other sources formed the basis of his first scientific paper, published in the Canadian Naturalist in 1870, and in the Annals and Magazine of Natural History of the following year. While a student at McGill he wrote a poem on Jacques Cartier which, while but a boyish effort was thought very well of by his instructors and gave evidence of his keen love of nature and poetic instinct. The view from the summit of Mount Royal, whither Cartier was conducted by the red men of Hochelaga, is thus described:

> "Far on the western river lay,
> Like molten gold, the dying day.
> Far to the east the waters glide
> Till lost in twilight's swelling tide;
> While all around, on either hand,
> Spread the broad, silent, tree-clad land;
> And in the distance far and blue
> Long swelling mountains close the view."

In 1870 Dawson went to London and entered the Royal School of Mines, at that time on Jermyn street. He was fond of the sea, and on this occasion made the passage in a sailing ship, he and another young man being the only passengers. During the voyage he amused himself making observations on the surface life of the ocean , and the phenomena of phosphorescence. He also studied navigation under the captain, and the knowledge then acquired afterwards stood him in good stead when he had to navigate a schooner along the dangerous coasts of British Columbia and the Queen Charlotte Islands.

At the School of Mines he took the full course of study, extending over three years, and passed as an associate. At the end of his second year, he carried off the Duke of Cornwall's scholarship, given by the Prince of Wales, and on graduation stood first in his class, obtaining the Edward Forbes Medal and Prize in Palæontology and Natural History, and the Murchison Medal in Geology. During his course he paid special attention to the study of geology under Ramsay, Huxley and Etheridge, but also devoted much time to chemistry and metallurgy, under Frankland and Percy respectively, and to mining under Warrington Smyth. Even in his holidays he was never altogether idle, and during most of the summer of 1871 he was attached to the British Geological Survey, and worked with the late J. Clifton Ward in the Cumberland Lake-District. While in England he made many warm friends, with some of whom he corresponded regularly for years afterwards.

On returning to Canada in 1872, he was engaged for some months examining and reporting upon mineral properties in Nova Scotia, and subsequently went to Quebec, where he delivered a course of lectures on chemistry at Morrin College, which was attended by a large and appreciative class. In 1873 he was appointed Geologist and Botanist to Her Majesty's North American Boundary Commission, which had been constituted to fix the boundary line between British North America and the United States, from the Lake of the Woods to the Rocky Mountains, and which had been carrying on its labours for about a year. From early boyhood Dawson had been keenly interested in travel and exploration, and in the Canadian Northwest he saw a region ready to yield up a rich harvest of discovery. There was the charm of novelty afforded by a well-nigh untrodden field, and the many hardships to be encountered only seemed to lend attractions to the expedition. In those days no Canadian Pacific trains rolled across the continent. Fort Garry, now the fast-growing city of Winnipeg, with more than 40,000 inhabitants, was then practically the last outpost of civilization, and the great prairies had to be traversed on horseback or on foot, provisions and equipment of every kind being carried in Red River carts, drawn by oxen or ponies with shaganappy harness. The two years of Dawson's connection with the Boundary Commission were for him years of incessant activity, but the results of his work were of great scientific value. They were embodied in a report addressed to the head of the Commission, Major (now General) D. R. Cameron, R.A., and published in Montreal in 1875.[1] The volume, which is now looked upon as "one of the classics of Canadian geology," is a model of what such reports should be—scientific facts being clearly and succinctly stated and the conclusions logically drawn. The main geological result arrived at was the examination and description of a section over 800 miles in length across the central region of the continent, which had been previously touched upon at a few points only, and in the vicinity of which a space of over 300 miles in longitude had remained even geographically unknown. The report discussed not merely the physical and general geology of the region, and the more detailed characteristics of the various geological formations, but also the capabilities of the country with reference to settlement. The whole edition was long ago distributed, and the volume is now exceedingly scarce and difficult to obtain. While attached to the Boundary Commission, Dawson made large collections of natural history specimens, which were forwarded to England and found a home in the British Museum, as well as at Kew and elsewhere. The British Museum obtained no less than seventeen species of mammals not previously represented in its collections.

More or less in connection with the above work were published papers on the "Lignite Formations of the West," the "Occurrence of Foraminifera, Coccoliths, etc., in the Cretaceous Rocks of Manitoba," on "Some Canadian Species of Spongillæ," on the "Superficial Geology of the Central Region of North America," on the "Locust Invasion of 1874 in Manitoba and the Northwest Territories," etc.

When the work of the Boundary Commission was brought to a close, Dawson received an appointment on the staff of the Geological Survey of Canada and began in that connection the long series of explorations of the Northwest and British Columbia, which brought such great credit to himself and his country. In 1883 he was made an Assistant Director of the Survey, and later, on the retirement of Dr. Selwyn, in 1895, became head of the department, a position which he occupied until the time of his death on the 2nd of March, 1901. Throughout his connection with the Survey his reports were always of a high order, bearing evidence of his striking powers of observation and deduction. Though thoroughly scientific, they always took account of the practical and economic side of geology, and accordingly commanded the attention and confidence of mining capitalists, mine managers and others interested in the development of the mineral resources of the country. When in the field, geology was, of course, the principal object of his investigations, but his wide knowledge of collateral sciences enabled him not merely to collect objects of natural history in an intelligent and discriminating way, and to discuss the flora and faunas of different districts, but also to make important observations on the habits and languages of Indian tribes, to keep continuous meteorological records and to determine latitudes and longitudes. We accordingly find that his reports generally conclude with a series of most valuable appendices, giving special information which could not well be included in the body of the document.

---

[1] Report on the Geology and Resources of the Region in the vicinity of the Forty-ninth Parallel, from the Lake of the Woods to the Rocky Mountains, with Lists of Plants and Animals collected and Notes on the Fossils.

In an elaborate notice of his report on the Queen Charlotte Islands, published in Petermann's Mittheilungen (Vol. 27, 1881), the writer, after calling attention to the fact that the report dealt not merely with the geology of the islands, but also with their topography, natural history, climate and ethnology, says: "One is amazed at the rich results which he brought back in all these branches, especially as he had only one assistant, Mr. Rankine Dawson, and remained in the islands only two and a half months, from the 12th of June to the end of August, and that in most unfavourably wet weather."

In addition to his field books proper, he kept copious journals which contain much interesting information. He had a habit too, of jotting down notes and sometimes verses on scraps of paper or on the backs of telegraph forms. In the wilds of British Columbia, for example, he writes:

"Contorted beds, of unknown age,
    My weary limbs shall bear,
Perhaps a neat synclinal fold
    At night shall be my lair.
Dips I shall take on unnamed streams,
    Or where the rocks strike, follow
Along the crested mountain ridge
    Or anticlinal hollow;
Or gently with the hammer stroke
    The slumbering petrifaction,
That for a hundred million years
    Has been debarred from action.

* * * * * * *

We can fancy him, too, sitting by his lonely camp fire on the shores of the Pacific and penning the following lines:

"To rest on fragrant cedar boughs
    Close by the western ocean's rim,
While in the tops of giant pines
    The live-long night the sea-winds hymn,
And low upon the fretted shore
    The waves beat out the evermore."

In common with British subjects in all parts of the world, he was deeply stirred by the occurrences of the South African war, and after the battle of Paardeberg (February 25th, 1900), in which his fellow countrymen played so conspicuous a part, he wrote as follows:—

"We know to-day our tale of dead,
Spent on the sun-baked windy plain,
Our best, who left us without dread,
But may not now return again.
But pride is mingled with our tears,
The seed grows to the stately tree;
We know that in the tide of years
We sow for empire yet to be.
Our loss our gain — nor sorrow felt
As rising in the east we see
The day flood all the waiting veldt.
But fathers, mothers, sisters, wives,
Your loss is more than you can bear;
For you those young, exultant lives
Gone out, is darkness everywhere.
We grieve with you, we stand to aid."

* * * * * * *

And yet his view of the war was not a wholly one-sided one, his fairness and his admiration for the Boer being evidenced by the following lines:

"The silent Boer that lies a clod,
He was a father or a son
Upon his dry, grey Transvaal sod
Among the rocks that we have won.
His narrow soul was true and strong,
To fend us from his home and kraal
He gave his life — we know him wrong,
But find him worthy after all:
And when in days to come the song
Of later harvests shall be sung
He will have part in that South land
As elder brother, true and strong.
Each spring that rises on the veldt
Will cast its wreath of self-sown flowers,
Will breathe its fragrance and be felt
About his grave as over ours.
Not all is lost if life be spent,
For it is good to truly die,
To give to that extreme extent
If so be freedom lives thereby.
The things not seen, beyond the veil,
Have harvest also full and true,
And loss we reckon but by tale
Is measured there — to each his due."

Dr. Dawson's geological work was carried on chiefly in the region of the great prairies of the Northwest and British Columbia, but he was thoroughly informed as to the geology of all parts of the Dominion. In the Northwest he paid particular attention to the relations of the Cretaceous and Laramie formations; and he discovered the presence in the Cretaceous of Southern Alberta of an important series of rocks — the Belly River group — which, he says, "must be considered on the whole as a fresh-water formation." The Kootanie group was also recognized by him as constituting a portion of the early Cretaceous in the Rocky Mountain region. His study of a large area in the interior plateau region of British Columbia established the existence there of a great series of mica-schists and gneisses supposed to be of Archæan age, and succeeded by Cambrian, Ordivician, Silurian and Carboniferous strata; while in the Cordilleran region of the same province he described the occurrence of great deposits of contemporaneous volcanic rocks, in various stages of metamorphism. While working in connection with the Boundary Commission also, he studied the crystalline rocks in the Lake of the Woods district, and concluded that a considerable portion of the Huronian formation there consists of metamorphosed volcanic rocks. He was a careful student of glacial phenomena and, according to Dr. G. J. Hinde,[1] was the first to describe the glacial origin of the Missouri Coteau, and in the interior of British Columbia, he has shown that at one period of the Ice Age there was a confluent ice-mass, the surface of which stood at a level of 7,000 feet above the sea, and that it must have been at least from 2,000 to 3,000 feet in thickness. He further established the fact that the movements of the glacier ice in this region were not only to the south and southeast, and through the transverse valleys and gaps of the coast ranges to the ocean, but that it had also a northerly flow, and passed down the valleys of the Pelly and Lewes branches of the Yukon river. Dr. Dawson also maintained that the northern part of the great plains had been submerged, and that their glaciation was in the main due to floating ice.

With regard to his ethnological work we cannot do better than quote from Mr. W. J. McGee's appreciative notice in the *American Anthropologist*. Mr. McGee says: "While several of Dr. Dawson's titles and the prefatory remarks in some of his papers imply that his ethnological researches were subsidiary to his geological work, and while his busy life never afforded opportunity for monographic treatment of Canada's aborigenes, it is nevertheless true that he made original observations and records of standard value, that much of his work is still unique, and that his contributions, both personal and indirect, materially enlarged knowledge of our native tribes. It is well within bounds to say that in addition to his other gifts to knowledge, George M. Dawson was one of Canada's foremost contributors to ethnology, and one of that handful of original observers whose work affords the foundation for scientific knowledge of the North American natives.

---

[1] Geol. Magazine, May, 1897.

Dawson's most notable contribution to ethnology was undoubtedly his memoir on the Haida Indians of the Queen Charlotte Islands, but he also published "Notes on the Indian Tribes of the Yukon District and Adjacent Northern Portion of British Columbia," a valuable memoir entitled "Notes and Observations on the Kwakiool People of Vancouver Island," "Notes on the Shuswap People of British Columbia," and other papers.

When in 1884, the British Association appointed a committee to study the physical characters, languages and social conditions of the Northwestern tribes of Canada, Dr. Dawson was made a member, and it devolved upon him to organize and administer the work of the committee. The work was carried on for years with much success and small money expenditure, and when, in 1896, an Ethnological Survey of Canada was instituted, Dawson was chosen as the head of the survey committee.

Not the least of his services to his country were those in connection with the Behring Sea Arbitration. He was one of the commissioners, and was sent by the British Government to the North Pacific Ocean to enquire into the conditions of seal life there. Subsequently, his evidence and forcible arguments undoubtedly secured for the British side of the case a much more favourable finding than would otherwise have been obtained. Lord Alverstone (now Lord Chief Justice of England) writing of him in this connection says: "It is not possible to overrate the services which Dr. Dawson rendered us in the Behring Sea Arbitration. I consulted him throughout on many questions of difficulty and never found his judgment to fail, and he was one of the most unselfish and charming characters that I ever met. I consider it a great pleasure to have known him." In recognition of his services on the Arbitration Dr. Dawson was made a C. M. G.

He received the degree of D. Sc., from Princeton in 1887, and that of LL.D. from Queen's University in 1890, from McGill University in 1891, and from Toronto University some years later. In 1891 he was awarded the Bigsby Gold Medal by the Geological Society for his services in the cause of geology, and was also elected a Fellow of the Royal Society. In 1893, he was elected President of the Royal Society of Canada, and in 1897 was President of the Geological Section of the British Association for the Advancement of Science at the Toronto meeting. In 1897 he was awarded the gold medal of the Royal Geographical Society. In 1900, he was President of the Geological Society of America, and gave his retiring address at the Albany meeting in December, choosing as his subject "The Geological Record of the Rocky Mountain Region in Canada." This address was published as a bulletin of the Geological Society of America, and will be prized as giving a summing up of his latest views on some of the problems connected with the complex geology of the west. Many other distinctions which cannot be enumerated here fell to his lot, and he won for himself the esteem and confidence of his fellow-countrymen in all parts of the Dominion. Nowhere was he more beloved than in British Columbia — the province in which he had done so much of his best work, and in which, he sometimes said to the writer. he would like to spend his last days.

After the Toronto meeting of the British Association, in 1897, he accompanied a party of the members on a trip across the continent, and all were struck with the warmth of the welcome everywhere accorded to him. "Among the many distinguished visitors," wrote the *Victoria Colonist*, "by whose presence Victoria has been honoured during the past few days, none holds a higher or more deserved place in the esteem of Canadians than George M. Dawson. In one sense he is the discoverer of Canada, for the Geological Survey of which he has been the chief, has done more than all other agencies combined to make the potentialities of the Dominion known to the world. He has been engaged in the work so long that he can look back over it with the profound satisfaction which comes from the knowledge that his judgment on points of extreme interest and value has been justified by events. The development of Kootenay, the hydraulic mines of Cariboo, and the gold mines in the Yukon are all foretold in the interesting pages of Dr. Dawson's earlier reports. Therefore, when we find in the voluminous products of his pen, wherein the results of his observations are recorded, anticipations of great mineral development in parts of the province that are as yet unexplored, we feel almost as if such developments were guaranteed. A careful observer, a conservative reasoner, a skilful writer, Canada possesses in Dr. Dawson a public servant the value of whose services can never be over-estimated. His name carries authority with it on any subject on which he speaks. That a long career may be before him is the hope of all, for we all know how much that means to the Dominion."

Dr. Dawson was a ready and prolific writer and a brilliant conversationalist. His quiet humour was infectious, and any dinner party which numbered him among the guests was sure to be a merry one.

He seemed to have an inexhaustible fund of information, not merely about his own special lines of work, but covering the widest range of subjects. The marvel was how in his busy life he had acquired so much and such varied knowledge. For one of apparently delicate constitution, his powers of enduring prolonged physical exertion were as remarkable as his capacity for continuous mental activity. He was at work at his office until two days before his death, the immediate cause of which was capillary bronchitis. The secret of Dr. Dawson's widespread popularity, no doubt, lay in his downright unselfishness and in his sunny and sympathetic nature.

Bibliography of Dr. George M. Dawson.

By Dr. H. M. Ami.

1870.

On Foraminifera from the Gulf and River St. Lawrence. *Canadian Naturalist*, N.S. Vol. vii, No. 5, pp. 172-180, June, 1870. Montreal. (Also separately, pp. 1-8.) Also in the Annals and Magazine of Natural History, 8vo. 4th series, Vol. VII, pp. 83-90, February, 1871. London, Eng.

1874.

The Lignite Formations of the West. *Canadian Naturalist*, Vol. vii, No. 5, pp. 241-252, April, Montreal. (Also separately with the next.)

Note on the Occurrence of Foraminifera, Coccoliths, etc., in the Cretaceous Rocks of Manitoba. *Canadian Naturalist*, Vol. vii, pp. 252-257, April. Montreal. (Also separately, with the foregoing.)

Marine Champlain deposits on lands north of Lake Superior. *American Journal of Science*, 3d series, p. 143 (1-4 p.).

The fluctuations of the American Lakes and the Development of Sun Spots. *Nature*, 4to., pp. 504-506, April, 1874. London. Also in *Canadian Naturalist*, Vol. vii, No. 6, pp. 310-317, November. Montreal.

Report on the Tertiary Lignite Formation in the Vicinity of the Forty-ninth Parallel. (British North American Boundary Commission.) 8vo. pp. 1-31. Montreal.

(Abstract, *American Journal of Science*, 3rd series, Vol. 8, pp. 142-143, 1 and 1-2 p. 1874.)

1875.

Report on the Geology and Resources of the Region in the Vicinity of the Forty-ninth Parallel. (British North American Boundary Commission.) 8vo. pp. I-XI and 1-387. Dawson Bros., Montreal.

On some Canadian Species of Spongillæ. *Canadian Naturalist*, Vol. viii, No. 1, pp. 1-5, November. Montreal. (Also separately, same pagination.)

On the Superficial Geology of the Central Region of North America. *Quarterly*

Journal Geological Society, 8vo. pp. 603-623, November. London. (Also separately, same pagination.)

1876.

Communication in J. A. Allen's Monograph, "The American Bisons, living and extinct," 173-174, with map on p. 173. Mem. Mus. Comp. Zool., Harvard College, Cambridge, Mass. Vol. 4, No. 10, 1876.

Notes on the Locust Invasion of 1874 in Manitoba and the North-West Territories. *Canadian Naturalist*, Vol. viii, No. 3, pp. 119-134. Montreal. (Also separately, pp. 1-16,)

Review of "Report on the Geol. & Resources, etc., Forty-ninth Parallel." (Anon.) *Canadian Naturalist*, Vol. viii, No. 2, p. 118. 1876.

1877.

Notes on the Appearance and Migrations of the Locust in Manitoba and the North-West Territories, Summer of 1875. *Canadian Naturalist*, Vol. viii. No. 4, pp. 207-226, April. Montreal. (Also separately, pp. 1-20.)

Notes on some of the more recent Changes in Level of the Coast of British Columbia and adjacent regions. *Canadian Naturalist*, Vol. viii, No. 4, pp. 241-248, April. Montreal. (Also separately, pp. 1-8.)

Mesozoic Volcanic Rocks of British Columbia and Chili. Relation of Volcanic and Metamorphic rocks. *Geological Magazine*, 8vo. pp. 314-317. July. London. (Also separately, pp. 1-4.)

Note on the Economic Minerals and Mines of British Columbia. First List of Localities in the Province of British Columbia, known to yield Gold, Coal, Iron, Copper and other Minerals of Economic Value. (Appendix R.) Report on Surveys, Canadian Pacific Railway, 8vo. pp. 218-245. Ottawa.

Note on Agriculture and Stock-Raising and Extent of Cultivable Land in British Columbia. (Appendix S.) Report of Surveys, Canadian Pacific Railway, 8vo. pp. 246-253. Ottawa.

Report on Explorations in British Columbia. Report of Progress, Geological Survey of Canada. 1875-76. 8vo. pp. 233-280. (Abstract *American Journal of Science*, 3rd series, Vol. 14, page 70, 1-8 p.)

1878.

On the Superficial Geology of British Columbia. *Philosophical Magazine*, Vol. 4, p. 237, 1877. *Quarterly Journal Geological Society*, London, Vol. 34, pp. 89-123, February. (Also separately, same pagination.)

Travelling Notes on the Surface Geology of the Pacific Coast. *Canadian Naturalist*, Vol. viii, No. 7, pp. 389-399, February. Montreal. (Also separately, pp. 1-11.)

Notes on the Locust in the North-West in 1876. *Canadian Naturalist*, Vol. viii, No. 7, pp. 411-417, April. Montreal. (Also separately, pp. 1-7.)

Erratics at High Levels in Northwestern America.—Barriers to a Great Ice Sheet. *Geological Magazine*, 8vo. pp. 209-212, May. London.

Report of Explorations in British Columbia, chiefly in the Basins of the Blackwater, Salmon and Nechacco Rivers, and on François Lake. Report of Progress, Geological Survey of Canada, 1876-77, 8vo. pp. 17-94. Montreal.

Report on Reconnaissance of Leech River and Vicinity. Report of Progress, Geological Survey of Canada. 1876-77, 8vo. pp. 95-102. Montreal.

General Note on the Mines and Minerals of Economic Value of British Columbia, with a list of localities, with appendix. Report of Progress, Geological Survey of Canada, 1876-77, 8vo. pp. 103-145. Montreal. (Also separately, same pagination.) Abstract, *American Journal of Science*, 3rd series, Vol. 16, p. 149. (1-2 p.) 1878.

1879.

On a Species of Loftusia from British Columbia. *Quarterly Journal Geological Society*, 8vo. pp. 69-75, February. London. (Also separately, same pagination.)

Notes on the Glaciation of British Columbia. *Canadian Naturalist*, n. s. Vol. ix, No. 1, pp. 32-39, March. Montreal. (Also separately, pp. 1-8.)

Sketch of the Past and Present Condition of the Indians of Canada, *Canadian Naturalist*, Vol. ix, No. 3, pp. 129-159, July. Montreal. (Also separately, pp. 1-31.)

Preliminary Report of the Physical and Geological Features of the Southern Portion of the Interior of British Columbia. Report of Progress. Geological Survey of Canada, 1877-78. 8vo. pp. 1B-187B. Montreal.

Abstract, *American Journal of Science*, 3rd series, Vol. 18, pp. 482-483. New Haven, Conn.

1880.

Memorandum on the Queen Charlotte Islands. British Columbia. (Appendix. No. 9.) Report Canadian Pacific Railway, 8vo. pp. 139-143. Ottawa.

Notes on the Distribution of Some of the More Important Trees of British Columbia. *Canadian Naturalist*, Vol. ix, No. 6, pp. 321-331, August. Montreal. (Also separately, pp. 1-11.) Reprinted with additions and corrections as an Appendix to Report on an Exploration from Fort Simpson, etc. Report of Progress, Geological Survey of Canada, 1879-80, pp. 167B-177B (with map). Montreal, 1881.

Report on the Climate and Agricultural Value, General Geological Features and Minerals of Economic Importance of part of the Northern portion of British Columbia and of the Peace River Country. (Appendix 7.) Report Canadian Pacific Railway, 8vo. pp. 107-151. Ottawa.

Report on the Queen Charlotte Islands. With Appendices A to G, etc. Report of Progress, Geological Survey of Canada, 1878-79, 8vo. pp. 1B-39B. Montreal. (Abstracts, *American Journal of Science*, 3rd series, Vol. 21, p. 243 (7-3 p.) 1881. *American Naturalist*, Vol. 15, p. 647, (1-3 p.) 1881.)

On the Haida Indians of the Queen Charlotte Islands. Report of Progress, Geological Survey of Canada, 1878-79. Appendix A to Report of the Queen Charlotte Islands, etc. (G. M. Dawson.)

Sketch of the Geology of British Columbia. (See 1881.) British Association Report, Vol. 50, Transactions, pp. 588-589, 1880. *Canadian Naturalist*. Vol. 9, n. s. pp. 445-447.

Vocabulary of the Haida Indians. Report of Progress, Geological Survey of Canada, 1878-79. Appendix B to Report on the Queen Charlotte Islands, etc.

1881.

Note on the Geology of the Peace River Region. *Canadian Naturalist*, Vol. x, No. 1, pp. 20-22, April, 1881. Montreal. Also in *American Journal of Science*, 8vo. pp. 391-394, May, 1881. New Haven.

Report on an Exploration from Fort Simpson to the Pacific Coast, to Edmonton, on the Saskatchewan, embracing a portion of the northern part of British Columbia and the Peace River Country. Report of Progress, Geological Survey of Canada, 1879-80, 8vo. pp. 1B-177B. Montreal, 1881. Illustrated.

Meteorological Observations in the Northern Part of British Columbia and the Peace River Country. Report of Progress, Geological Survey of Canada, 1879-80. Appendix II to Report on an Exploration from Fort Simpson, etc. (G. M. Dawson.)

Note on the Latitudes and Longitudes used in preparing the map of the Region from the Pacific Coast to Edmonton. Report of Progress, Geological Survey of Canada, 1879-80. Appendix III to Report on an Exploration from Fort Simpson, etc.

Der Queen Charlotte-Archipel. Petermann's Mitt., Vol. 27, pp. 331-347, map. 4°.

On the Lignite Tertiary Formation from the Souris River to the one hundred and eighth meridian. Report of Progress, Geological Survey of Canada, 1879-80, 8vo. pp. 12A-49A. Montreal. Abstract, (*Philadelphia Magazine*, n. s., Vol. 14, pp. 70-71. (1-3 p.) 1881.)

1882.

The Haidas. *Harper's Magazine*, Vol. xlv, 8vo. pp. 401-408, August. New York.

Descriptive Note on a General Section from the Laurentian Axis to the Rocky Mountains north of the 49th parallel. Transactions Royal Society of Canada, Vol. 1, Sec. 4, 4to, pp. 39-44, 1883. (Also separately, same pagination.

1883.

Notes on the more important Coal-seams of the Bow and Belly River Districts. *Canadian Naturalist*, Vol. X, No. 7, pp. 423-435, March, 1883. 8vo. Montreal.

Note on the Triassic of the Rocky Mountains and British Columbia. Transactions of the Royal Society of Canada, Vol. 1, Sec. 4, 4to. pp. 143-145. (Also separately, same pagination.)

Preliminary on the Geology of the Bow and Belly River Region, North-West Territory. With special reference to the Coal Deposits. Report of Progress, Geological Survey of Canada, 1880-82, 8vo. pp. 1B-23B. Montreal.

Glacial deposits of the Bow and Belly River Country. *Science*, Vol. 1, pp. 477-479.

List of Elevations. Report of Progress, Geological Survey of Canada, 1882-83-84. Appendix I to Report on a region in the vicinity of the Bow and Belly Rivers, N.W.T. (G. M. Dawson.)

Abstracts, *Canadian Naturalist*, n. s., Vol. 10, pp. 423-435. *Science*, Vol. 1, pp. 429-430.

1884.

On the occurrence of Phosphates in Nature. Transactions Ottawa Field Naturalists' Club, 8vo. pp. 91-98, February. Ottawa.

(and Selwyn, A. R. C.) Descriptive Sketch of the Physical Geography and Geology of the Dominion of Canada, 8vo., pp. 1-55. Montreal.

(and Tolmie, W. F.) Comparative Vocabularies of the Indian Tribes of British Columbia. With a map illustrating distribution, 8vo. pp. 1-131. Montreal.

(Abstract, *Science*, Vol. v, pp. 156-157 (4-5 p.) New York City.

Recent Geological Observations in the Canadian North-West Territory. *Science*, Vol. 3, pp. 637-648.

Notes on the Coals and Lignites of the Canadian North-West. 8vo. pp. 1-21. Montreal Printing and Publishing Co., Montreal.

1885.

On the Microscopic structure of certain Boulder Clays and the Organisms contained in them. Bulletin Chicago Academy of Science, 8vo. pp. 59-69, June. Chicago. (Also separately, same pagination.) 13th Annual Report Geological and Natural History Sirvey Minnesota, pp. 150-163. St. Paul.

The Dominion of Canada. (Part thus entitled in "Macfarlane's American Geological Railway Guide.") 8vo. pp. 51-83, June. D. Appleton & Co., New York. (Also separately, same pagination.)

The Saskatchewan Country. *Science*, Vol. 5, pp. 340-542, with map, 1885.

Report on the Region in the vicinity of Bow and Belly Rivers, N.W.T. Report of Progress, Geological Survey of Canada, 1882-84, 8vo. pp. 1C-169C. Montreal.

On the Superficial Deposits and Glaciation of the District in the Vicinity of the Bow and Belly Rivers. (Reprinted from the Report of Progress, Geological Survey of Canada, 1882-84, 8vo. pp. 1-14. (Abstracts, *Science*, Vol. 6, pp. 522 (1-8 p.) *American Journal of Science*, 3rd series, Vol. 29, pp. 408-411. *American Naturalist*, Vol. 21, pp. 171-172 (with comments by G. M. Dawson).

1886.

On Certain Borings in Manitoba and the North-West Territory. Transactions Royal Society of Canada, Vol. iv, Sec. 4, 4to., pp. 85-99. (Also separately, same pagination.) (Abstract, *Geological Magazine*, 3rd decade, Vol. 4, pp. 278-289, 1887.)

Preliminary Report on the Physical and Geological Features of that Portion of the Rocky Mountains between Latitudes 49 degrees and 51° 30'. Annual Report Geological Survey of Canada (N.S.) Vol. 1, 8vo. pp. 1B-169B. Montreal. (Also separately, same pagination.) (Abstracts, *American Journal of Science*, 3rd series, Vol. 33, p. 317 (1-2 p.) 1887. *Geological Magazine*, decade 3, Vol. 4, pp. 176-178. 1887.)

1887.

On the Canadian Rocky Mountains, with special reference to that part of the Range between the forty-ninth parallel and the headwaters of the Red Deer River. *Canadian Record of Science*, Vol. ii, No. 5, pp. 285-300, April, 1887. Montreal. (Also separately, pp. 1-16.)

Note on the Occurrence of Jade in British Columbia and its Employment by the Natives. With extracts from a paper by Prof. Meyer. *Canadian Record of Science*, Vol. ii, No. 6, pp. 364-378, April, 1887. Montreal. (Also separately, pp. 1-15.)

Notes and observations on the Kwakiool People of Vancouver Island. Transactions Royal Society of Canada, Vol. iv, Sec. 2, 4to. pp. 1-36, 1887. (Also separately, same pagination.) (Abstract with geology, British Association Report of 56th meeting, pp. 638-639.)

Notes on the Exploration in Yukon District. *Science*, Vol. 10, pp. 165-166, reproduced from *Montreal Gazette*.

Report on geological examination of the northern part of Vancouver Island and adjacent coasts. Report Geological and Natural History Survey of

Canada, part B pp. 1-107, plates, map No. 1, in atlas. Montreal. (Abstract *Geological Magazine*, 3rd decade, Vol. 6, 130-133.)

Notes to accompany a geological map of the northern portion of the Dominion of Canada, east of the Rocky Mountains. Report of the Geological and Natural History Survey of Canada, 1886, part R, 62 pp. coloured map, 1887. Montreal. Abstract in *Geological Magazine*, 3rd decade, Vol. 6, pp. 137-138.)

Meteorological Observations, 1885. Appendix III to Report on a Geological Examination of the Northern Part of Vancouver Island, and adjacent Coast. Annual Report, Geological Survey of Canada, New series, Vol. 2, 1886, issued 1887. Montreal.

1888.

Recent Observations on the Glaciation of British Columbia and Adjacent Regions. *Geological Magazine*, 8vo. pp. 347-350, August, 1888. London. *American Geologist*, Vol. 3, pp. 249-253, 1889. (Also separately, same pagination.)

Report on the Exploration in the Yukon District, N.W.T., and adjacent Northern portion of British Columbia. Annual Report, Geological Survey of Canada. (N.S.) Vol. iii, 8vo. pp. 1B-277B. 1888. Montreal. (Abstracts, *ibid.*, Report A, pp. 4-12; *American Geologist*, Vol. 5, pp. 240-241 (2-3 p.); *American Journal of Science*, 3rd series, Vol. 39, p. 238 (1-2 p.), 1888.)

Notes on the distribution of Trees and of certain Shrubs in the Yukon District and adjacent Northern portion of British Columbia. Annual Report, Geological Survey of Canada, New series, Vol. iii, 1887-88, Appendix I to Report of an Exploration in the Yukon District, N.W.T., etc. (G. M. Dawson.) Montreal.

Notes on the Indian Tribes of the same district. Annual Report Geological Survey of Canada, new series, Vol. iii, 1887-88. Appendix II to Report of an Exploration in the Yukon District, N.W.T., etc. (G. M. Dawson.) Montreal (out of print).

1888.

Meteorological Observations in the same district. Annual Report, Geological Survey of Canada, new series, Vol. iii, 1887-88. Appendix VI to Report of an Exploration in the Yukon District, N.W.T., etc. (G. M. Dawson.) Montreal.

Summary of Astronomical Observations employed in the construction of Maps, Nos. 274-277. Annual Report, Geological Survey of Canada, new series, Vol. iii, 1887-88. Appendix VI to Report of an Exploration in the Yukon District, N.W.T., etc. (G. M. Dawson.) Montreal.

Account of Explorations in southern interior British Columbia. Report Geological Survey of Canada, Vol. III, n. s. pp. 60A-66A. Montreal.

Note on the Cascade anthracite basin, Rocky Mountains. *American Geologist*, Vol. i, pp. 332-333.

The Geological Observations of the Yukon Expedition, 1887. *Science*, Vol. II, pp. 185-186, 4°.

Notes on the Indian Tribes of the Yukon District and adjacent Northern portion of British Columbia. (Reprinted from the Annual Report of Geological Survey of Canada, 1887.) 8vo. pp. 1-23.

Mineral Wealth of British Columbia with annotated list of localities of Minerals of Economic Value. Annual Report, Geological Survey of Canada (N.S.), Vol. 4, 8vo. pp. 1R-163R. (Also separately, same pagination.)

Views of the Archæan. Report American Committee, International Congress of Geologists, 1889, A. *American Geologist*, Vol. 2, pp. 146-184, in part, 1888.

1889.

Glaciation of High Points in the Southern Interior of British Columbia. *Geological Magazine*, 8vo. pp. 350-351, August. London. (Also separately, same pagination.) (Abstracts, *Ottawa Naturalist*, Vol. 3, pp. 112-113, (4-5 p.); *American Naturalist*, Vol. 24, pp. 771, 4 lines.

On the earlier Cretaceous rocks of the North-western portion of the Dominion of Canada. *American Journal of Science*, 8vo. pp. 120-127, August. New Haven. (Also separately, same pagination.) (Abstract, *Nature*, Vol. 40, p. 404 (11 lines.)

Notes on the Ore Deposit of the Treadwell Mine, Alaska. *American Geologist*, 8vo. pp. 84-93, August. Minneapolis. (Also separately, same pagination.)

1890.

Notes on the Cretaceous of the British Columbia Region. The Nanaimo Group. *American Journal of Science*, 8vo. pp. 180-183, March. New Haven. (Also separately, same pagination.) (Abstract, *American Naturalist*, Vol. 24, p. 764 (1-2 p.).

On some of the larger unexplored Regions of Canada. *Ottawa Naturalist*, 8vo. pp. 29-40, May. Ottawa. (Also separately, pp. 1-12.) Also printed as Appendix to Pike's Barren Ground of Northern Canada. 1892, London, 8vo. p. 177-189, 1892. Macmillan & Co. London.

On the Glaciation of the Northern Part of the Cordillera, with an attempt to correlate the events of the Glacial Period in the Cordillera and Great Plains. *American Geologist*, 8vo. pp. 153-162, September. Minneapolis. (Also separately, same pagination.)

On the Later Physiographical Geology of the Rocky Mountain Region in Canada, with special reference to Changes in Elevation and the History of the Glacial Period. Transactions Royal Society of Canada. Vol. viii, Sec. 4, 4to. pp. 3-74 (pls. 1-3). (Also separately, same pagination.)

Report on a Portion of the West Kootanie District, British Columbia. Annual Report, Geological Survey of Canada (N.S.), Vol. iv, 8vo. pp. 1B-66B. Montreal. (Also separately, same pagination.) (Abstract, *American Geologist*, Vol. 8, pp. 392-394.)

Introductory Note on an expedition down the Begh-ula or Anderson River, by R. Macfarlane. *Canadian Record of Science*, Vol. 4, No. 1, pp. 28-29. Jan., 1890.

The Chalk from the Niobrara Cretaceous of Kansas. *Science*, Vol. 16, p. 276 (1-4 col.), 4o.

Northern Pacific Railroad. Macfarlane's Geological Railway Guide, 2d edition, pp. 258-266; 261, 262.

The Dominion of Canada. Macfarlane's Geological Railway Guide, 2nd edition, pp. 51-83.

1891.

Northern Extension of earlier Cretaceous in Western British North America. Bulletin Geological Society of America, Vol. 2, p. 207 (1-4 p.). (In discussion of paper by G. F. Becker, "Notes on the Early Cretaceous of California and Oregon.")

Remarks on the Glaciation of the Great Plains Region. Bulletin Geological Society America, Vol. 2, pp. 275-276, 1891. (Abstract, *American Geologist*, Vol. 7, p. 143, 5 lines.) Discussion of paper by W. Upham, "Glacial Lakes of Canada."

Note on the Geological Structure of the Selkirk Range. Bulletin Geological Society of America, Vol. 2, pp. 165-176. (Discussed by C. D. Walcott, p. 611 (1-4 p.) (Abstracts, *American Geologist*, Vol. 7, pp. 262-263 (1-2 p.); *American Naturalist*, Vol. 25, p. 658, 3 lines. (Also separately, same pagination.

Notes on the Shuswap People of British Columbia. Transactions Royal Society of Canada, Vol. ix, Sec. 2, 4to. pp. 3-44. (Also separately, same pagination.)

1892.

(and Alex. Sutherland) Geography of the British Colonies, 8vo. pp. i-xiii, and 1-330. Macmillan & Co., London.

(and Baden-Powell, Sir G.) Report of the British Behring Sea Commissioners, London: Government, pp. i-vii; 1-241. London, Eng.

Notes on the Geology of Middleton Island, Alaska. Bulletin Geological Society of America, Vol. iv, 8vo. pp. 427-431. Rochester.

1893.

Mineral Wealth of British Columbia. Proceedings of the Royal Colonial Institute, Vol. xxiv, 8vo. pp. 238-264.

Mammoth Remains. (Abstract and notice of papers read before the Geological Society, No. 8. *Nature*, Vol. 49, No. 1156, Nov. 23, p. 94.)

Notes on the occurrence of Mammoth Remains in the Yukon District of Canada and in Alaska. Abstracts and notice of papers read before the Geological Society, London. *Quarterly Journal Geological Society*, Nov. 8th. Proc. of meeting, *Geological Magazine*, Dec., No. 354. London, Eng.

1894.

Geographical and Geological Sketch of Canada, with notes on Minerals, Climate, Immigration and Native Races. Baedeker's Dominion of Canada Hand Book, 12mo. pp. 23-48. Lipsic.

Notes on the Occurrence of Mammoth Remains in the Yukon District of Canada and in Alaska. *Quarterly Journal Geological Society*, 8vo. pp. 1-9, February. London. (Also separately, same pagination.) Also in *Geological Magazine*, Dec., No. 354.

Geological Notes on some of the Coasts and Islands of Behring Sea and vicinity. Bulletin Geological Society of America, 8vo. pp. 117-146. February, 1894, Rochester. (Also separately, same pagination.)

1895.

Interglacial Climatic Conditions. *American Geologist*, Vol. 16, No. 1, pp. 65-66, 1895.

Summary Report of Geological work in British Columbia for 1894. Printed by Order of Parliament. Ottawa, 1896.

1896.

Summary Report of the Director, for the year 1894. With map No. 554. (Reprint from Blue Book.) pp. 124. Annual Report Geological Survey of Canada, new series, Vol. vii. Ottawa.

Report on the Area of the Kamloops Map-sheet, British Columbia. With Appendices I-IV, and Maps Nos. 556 and 557, pp. 427. Report B. Annual Report Geological Survey of Canada, new series, Vol. vii, 1894. Ottawa.

Shuswap names of places within the area of the Kamloops map-sheet. Annual Report, Geological Survey of Canada, new series, Vol. vii, 1894. Appendix II to Report on the Area of the Kamloops Map-sheet, British Columbia. (G. M. Dawson.) Ottawa.

Notes on the Upper and Lower Limits of Growth of some Trees and other Plants in different Places within the area of the Kamloops Map-sheet. Annual Report Geological Survey of Canada, n. s. Vol. vii, 1894. Appendix III to Report on the area of the Kamloops Map-sheet, British Columbia. (G. M. Dawson.) Ottawa.

Comparative Observations of Temperatures at different Altitudes in or near the Region embraced by the Kamloops Sheet, Southern interior of British Columbia, during parts of the years 1888, 1889 and 1890. Annual Report Geological Survey of Canada, n. s. Vol. vii, 1894. Appendix IV to Report on the area of the Kamloops Map-sheet, British Columbia. (G. M. Dawson.) Ottawa.

Some Observations tending to show the occurrences of secular climatic changes in British Columbia. Transactions Royal Society of Canada, 2nd series, Sec. 4, Vol. 2, pp. 159-166. Montreal.

1897.

Summary Report of Director for the year 1895, pp. 154, (Reprint from Bluebook.) Annual Report Geological Survey of Canada, n. s. Vol. viii, Report A. Otawa.

Address to the Geological Section. (The nature and relations of the more ancient rocks). British Association for the Advancement of Science. Toronto Meeting, 1897. Section C. 13 pp. Printed by Spottiswood and Eyre, London.

1898.

Summary Report of the Director for the year 1896 (Reprint from Blue-book) pp. 144. Annual Report, Geological Survey of Canada, n. s. Vol. ix. Report A. Ottawa.

Annual Report, Geological Survey of Canada, new series, Vol. 9, 1896 (1898), 816 pp., maps, containing the Director's Summary Report for 1896, and reports by Tyrrell, Bell, Low, Bailey, Hoffmann and Ingall, etc., also 20 plates. Queen's Printer, Ottawa.

Duplication of geolgic formation names. (Discussion and correspondence.) *Science*, n. s., Vol. ix, pp. 592-593. 1899.

Summary Report of the Geological Survey of Canada for the year 1897. Geological Survey of Canada, 156 pages. Ottawa. Compiled by the Director.

1899.

Summary Report of the Geological Survey Department, for the year 1898 (containing also reports of the several technical officers of the Geological

Survey Staff, on the geology, etc., of various portions of the Dominion of Canada). 208 pp. Govt. Printing Bureau, Ottawa.

Summary Report of the Director for the year 1898 (Reprint from Blue-book), pp. 208. Annual Report, Geological Survey of Canada, n. s. Vol. xi. Report A.

(On Mammoth and musk-ox remains from the Saskatchewan gold-bearing gravels of the Edmonton district, Alberta.) Summary Report, 1898. Geological Survey of Canada, pp. 19-20. Govt. Printing Bureau, Ottawa.

Summary Report of the Director for the year 1897 (Report from Blue-book), pp. 156, with Map No. 639. Annual Report, Geological Survey of Canada, n. s. Vol. xx, 1897. Report A 1899. Ottawa.

1900.

Summary Report of the Geological Survey Department for the year 1899, 224 pp. Printed by order of Parliament. Ottawa, 1900.

Economic Minerals of Canada. Paris International Exhibition, 1900, with map, 54 pp. Toronto, Canada.

Remarkable landslip in Portneuf County, Quebec. Bull. Geol. Soc., Amer., Vol. x, pp. 484 490, plates 50 and 51. Rochester, N.Y. 1900.

1901.

On the Geological Record of the Rocky Mountain Region in Canada. Address by the President. Bull. Geol. Soc. Amer., Vol. xii, pp. 57-92. Rochester, N.Y., Feb., 1901. Abstract of same in *Scientific American Supplement*, No. 1307, pp. 20948 and 20949, Jan. 19th, 1901. In part published in *Science*, n. s., Vol. xiii. No. 324, pp. 401-407, March 15th, 1901, under the title: "Physical History of the Rocky Mountain Region in Canada." New York City.

(George Mercer Dawson), with portrait. Obituary notice by Dr. W. J. McGee, *The American Anthropologist*, n. s., Vol. 3, pp. 159-163, May, 1901.

(The late George Mercer Dawson), with portrait. Obituary notice by H. M. Ami in *The Ottawa Naturalist*, Vol. xv, No. 2, pp. 43-52, May, 1901.

(George Mercer Dawson). With portrait. Biographical sketch, by B. J. Harrington. *American Geologist*, August, 1901, pp. 66-67. Bibliography of Dr. G. M. Dawson, by H. M. Ami, pp. 76-86. Minneapolis, Minn.

GEOL…
LIBRARY

Date Due

MAR 24 -2 PM			

Demco 38-297

3 2000 004 343 077

GEOLO
LIBRAR

SERIAL